STRUCTURE OF MICROCARD

A01/1 = Structure of microcard

A03/1 = Special features, general information, safety precautions, testers and tools, tightening torques, test set-up, diagram of lines and connection diagram

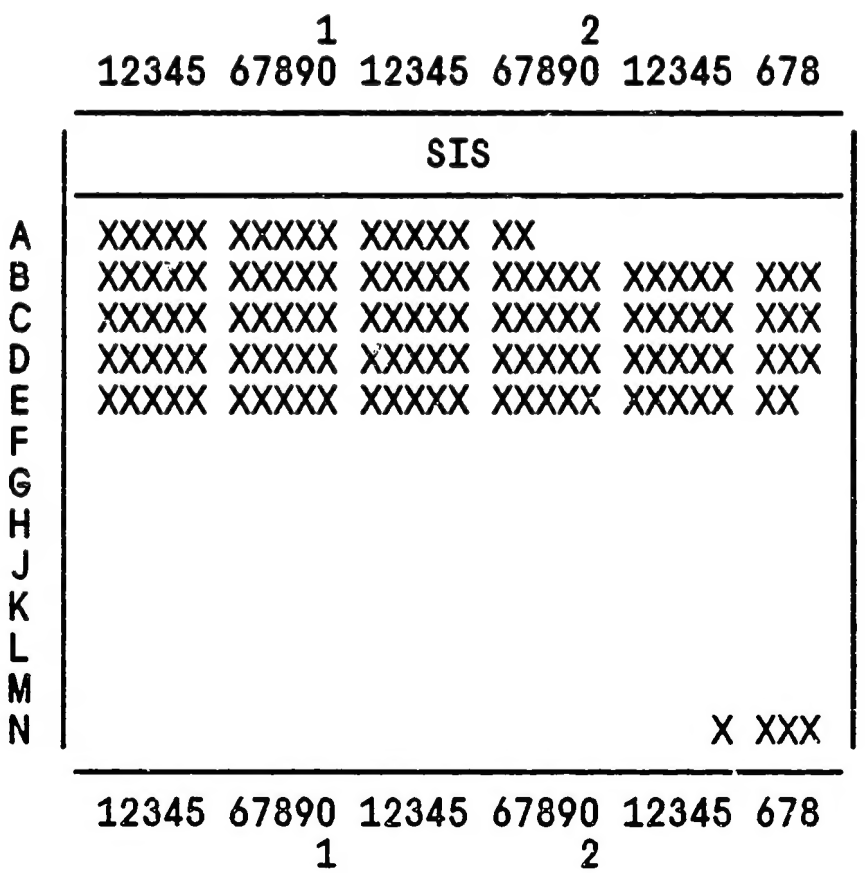
C01/1 = Checking fuel-injection pump

N18/1 = Index

N22/1 = Table of contents

N28/1 = Editorial note

Continue: A02/1 Fig.: A01/2



Continue: ■

STRUCTURE OF MICROCARD

The user prompting appears on every page, e.g.:
– Continue: B17/1
– Continue: B18/1 Fig.: B17/2

.../1 = Upper coordinate half
.../2 = Lower coordinate half

Continue: A03/1

CHECKING AND ADJUSTING DISTRIBUTOR-TYPE FUEL INJECTION PUMP

These instructions deal with the checking and adjusting of VE pumps with:

* Boost-pressure-dependent full load stop with LDA housing
* Boost-pressure-dependent full load stop with external LDA
* Hydraulic torque control (HBA)

Special features:

* Temperature-controlled starting fuel delivery (TAS)
* Temperature-controlled idle increase (TLA)

Continue: A03/2

CHECKING AND ADJUSTING DISTRIBUTOR-TYPE FUEL INJECTION PUMP

Special features

* Temperature-controlled idle increase acting on housing-fixed idle spring
* Mechanical power on/off damper (MLD)
* Spring-actuated power on/off damper (FLD)
* Idle increase coupled with timing device acting on cold-start acceleration device (KSB)
* Potentiometer adjustment
* Microswitch adjustment
* Static start-of-delivery blocking
* Pneumatic idle increase (PLA)

Continue: A04/1

CHECKING INSTRUCTIONS

General
These test instructions contain all the necessary information and data to be observed when adjusting and checking the distributor-type fuel-injection pump.
- Information on calibrating oil is to be taken from table of contents W-400/00.
The sequence of operations described corresponds to the sequence of information in the test-specification sheet.

EXCEPTION: Full-load pre-adjustment

Continue: A04/2

CHECKING INSTRUCTIONS

Note on test specifications

When adjusting distributor-type fuel-injection pump, the only settings which apply are those which are not given in brackets in the test-specification sheet.

Continue: A05/1

CHECKING INSTRUCTIONS

Functional test (check):

If the distributor-type fuel-injection pump is merely checked for proper functioning and adjustment w i t h o u t prior repair, use is to be made for this test of the values i n b r a c k e t s in the test-specification sheet (check values).
The settings n o t in brackets apply if the distributor-type fuel-injection pump has to be corrected.

Continue: A05/2

CHECKING INSTRUCTIONS

Item numbers:

Item numbers appearing in the text do n o t correspond to the item numbers in the service-parts list.

Continue: A06/1

SAFETY PRECAUTIONS

The following safety precautions are to be observed in addition to the safety instructions outlined in the operating manuals for Bosch injection-pump test benches:

1. Damaged injection pumps are not to be tested.
2. Use is to be made of the tools, drives and clampling elements specified in these instructions to avoid accidents.
   Non-observance of the above could also lead to test-specimen damage and incorrect settings.

Continue: A06/2

SAFETY PRECAUTIONS

3. Install test-pressure lines on delivery-valve holder and calibrating nozzle-holder assembly.
   Take care not to damage connecting nipple of test-pressure line when doing so.
   A damaged connecting nipple may allow calibrating oil to emerge at high pressure. DANGER OF INJURY.

Continue: A07/1

SAFETY PRECAUTIONS

4. Kinked test-pressure lines, test-pressure lines damaged at the sealing surfaces of the connecting nipple and test-pressure lines with impermissible bending radii are to be replaced (refer to W 400/000: Test benches, test equipment and instructions on how to test injection pumps).
   If damaged test-pressure lines are used for test purposes, this will result in incorrect settings.
   A damaged line may also result in the emergence of high-pressure calibrating oil and cause injury.

Continue: A07/2

SAFETY PRECAUTIONS

5. Before driving injection pump on injection-pump test bench, check pump by hand for freedom of movement. If the pump drive is sticking or moving pump parts are jammed and the pump is driven nevertheless, this can lead to further pump damage and damage to the test bench.

Continue: A08/1

SAFETY PRECAUTIONS

6. The test specimen may only be checked in the prescribed direction of rotation and at the maximum prescribed speed.
   The direction of rotation and maximum prescribed speed are outlined in the appropriate test-specification sheet.

7. Protective goggles are to be worn during the test.

Continue: A08/2

SAFETY PRECAUTIONS

ONLY use special tools/testers listed in these test and repair instructions!

The use of other tools/testers could RESULT IN INJURY; system adjustment errors can likewise not be ruled out.

Continue: A09/1

TOOLS AND TEST EQUIPMENT

Clamping flange Pilot 50 mm diameter /	1 685 720 062
Clamping flange Pilot 68 mm diameter /	1 685 720 219
Measuring device for measuring timing-device travel	1 688 130 139
Coupling half Taper 17 mm	1 686 430 022
Coupling half Taper 20 mm	1 686 430 024

Continue: A09/2

TOOLS AND TEST EQUIPMENT

Coupling half Taper 25 mm e.g. VE..R119	1 686 430 010
Tester for measuring inlet and supply pump pressure	1 688 130 075
Puller for pulling out clamping sleeve of control valve	KDEP 1027
Socket wrench for installing controller	KDEP 1086

Continue: A10/1

TOOLS AND TEST EQUIPMENT

Adjusting tool for adjusting governor shaft	KDEP 1082
Stamping tool for stamping 2-piece control lever	KDEP 1107
Stamping tool for stamping spacer sleeve, full-load screw	KDEP 1106
Pressing-in tool for adjusting supply pump pressure	KDEP 1092

Continue: A10/2

TOOLS AND TEST EQUIPMENT

Pressing-in tool for pressing in clamping sleeve, pressure regulator	KDEP 1093
Fixing pin for adjusting notched plate	KDEP 1108
Prestroke measuring device Replacement for..045 for adjusting prestroke	1 688 130 180
Dial indicator, scale divisions 0.01 mm with base thread M3	1 687 233 012

Continue: A11/1

TOOLS AND TEST EQUIPMENT

Temperature indicator for measuring overflow temperature	1 687 230 029
ALDA tester	0 684 200 610
Puller Drive pinion, pump drive shaft	KDEP 1131
Adjusting tool for adjusting stop lever	KDEP 1152/3
Setting mandrel for blocking coupling half	KDEP 1173

Continue: A11/2

TOOLS AND TEST EQUIPMENT

Dial-indicator holder	KDEP 1088
Centering sleeve	KDEP 1088/0/3
Measurement insert for adjusting K1 dimension	KDEP 1088/0/2
Wrench for removing central screw plug	KDEP 1080
Range spacer for adjusting EGR part-load delivery	KDEP 1176
Adjustment screw for fixing control lever	KDEP 1177

Continue: A12/1

TOOLS AND TEST EQUIPMENT

Adjusting tool for adjusting LFB	KDEP 1181
Measuring device for calibrating LDA (dimensions "C" and "F")	KDEP 1088
Measuring-device set comprising:	KDEP 1152
Spacer	KDEP 1152/1
Adjustment gauge	KDEP 1152/2
Adjusting tool for adjusting sliding-sleeve starting travel with pumps featuring LDA	KDEP 1152/3

Continue: A12/2

TOOLS AND TEST EQUIPMENT

Mount Nozzle-holder assembly	KDEP 1140
Adjustment gauge for setting EGR valve	KDEP 1142
Fixing pin for blocking drive shaft	KDEP 1150
Timing-device cover FB setting in line with plunger stroke, pump with HBA	KDEP 1151

Continue: A13/1

TOOLS AND TEST EQUIPMENT

Hook wrench for loosening coupling half, pump with HBA	comm. available
Restrictor Testing with boost pressure	1 688 130 132
For this purpose,	
Pressure reducer	comm. available
Pressure gauge 0...4 bar e.g. Kraiss & Fritz Stuttgart	No. 104

Continue: A13/2

TOOLS AND TEST EQUIPMENT

Pressure gauge 0...1.6 bar Quality class 1.0 Scale divisions 0.05 e.g. Wilka	comm. available No. 4184
Multi-way cock (flushing valve)	1 687 409 030
Measuring device for setting MS dimension Pump with negative torque control	KDEP 1089

Continue: A14/1

TIGHTENING TORQUES

Select torques in line with following add-on modules:

	Coordinate
VE without add-on module	A17/1
Boost-pressure-dependent full-load stop (LDA) Version: LDA housing	A21/1
Roller ring, cold-start acceleration device, coolant temperature-controlled	A22/1

Continue: A14/2

TIGHTENING TORQUES

Select torques in line with following add-on modules:

	Coordinate
2-piece control lever	A23/1
Bleeder screw at roller ring level	A24/1
Coupling half and flange	A25/1
Control-lever potentiometer	A27/1

Continue: A15/1

TIGHTENING TORQUES

Select torques in line with following add-on modules:

	Coordinate
Boost-pressure-dependent full load stop Version: External LDA	A28/1
Frequency valve	B02/1
Hydraulic cold-start acceleration device	B03/1
Hydraulic torque control (HBA)	B05/1

Continue: A15/2

TIGHTENING TORQUES

Select torques in line with following add-on modules:

	Coordinate
Mechanical power on/off damper	B06/1
Spring-actuated power on/off damper	B07/1
Timing device KSB coupled with LFG lever	B08/1
Microswitch	B09/1
Sealing cap of rated-speed adjusting screw	B10/1

Continue: A16/1

TIGHTENING TORQUES

Select torques in line with following add-on modules:

	Coordinate
Pneumatic idle increase (PLA)	B11/1
Temperature-dependent idle increase (TLA)	B12/1
Mounting plate	B13/1
Additional lever for spring-actuated power on/off damper	B14/1

Continue: A16/2

TIGHTENING TORQUES

Select torques in line with following add-on modules:

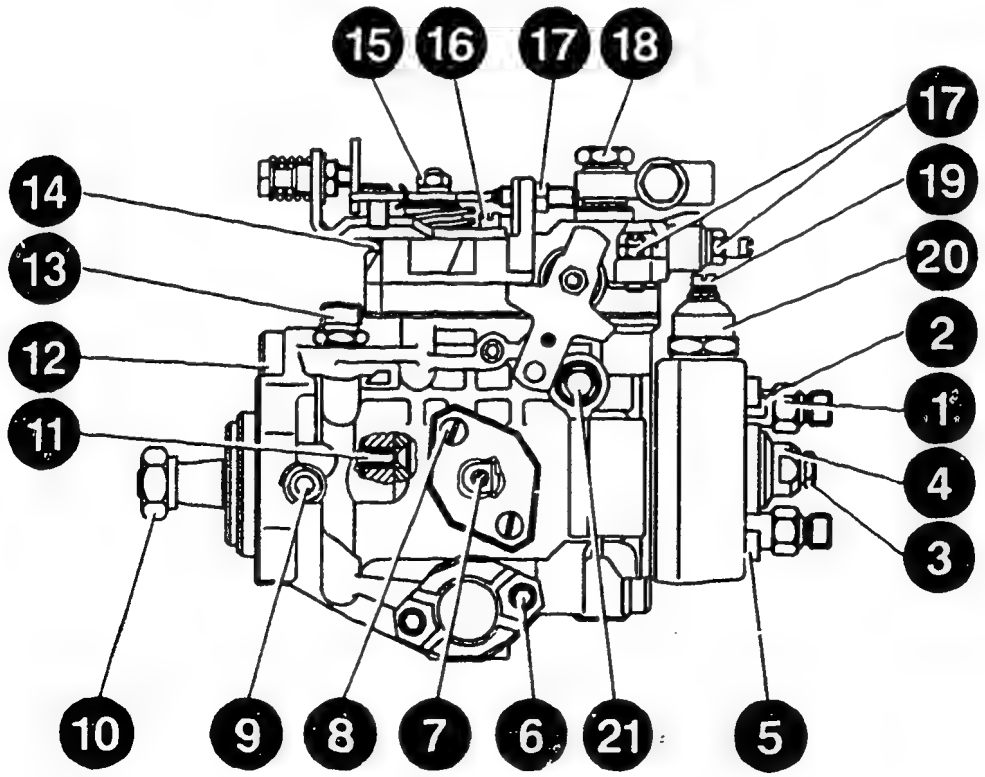
	Coordinate
Stop bracket for switching-point adjustment	B15/1
Full-load adjuster	B16/1
Return line from HBA	B17/1
Straight pin LDA	B18/1
Switching valve	B19/1

Continue: A17/1

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

1 =	Delivery-valve holder	38..42 Nm
	Used delivery-valve holders Delivery-valve holder	38..48 Nm
	New delivery-valve holders, new distributor head	
2 =	Bleeder screw	5.. 8 Nm
3 =	Bleeder screw	20..26 Nm
4 =	Screw plug	70..90 Nm
5 =	Fillister-head/hexagon-socket-head cap screw	7..10 Nm
6 =	Fillister-head screw	10..14 Nm
7 =	Fillister-head screw-pointer	2.. 3 Nm
8 =	Fillister-head screw	6.. 9 Nm
9 =	Locking screw	27..35 Nm

Continue: A18/1 Fig.: A17/2

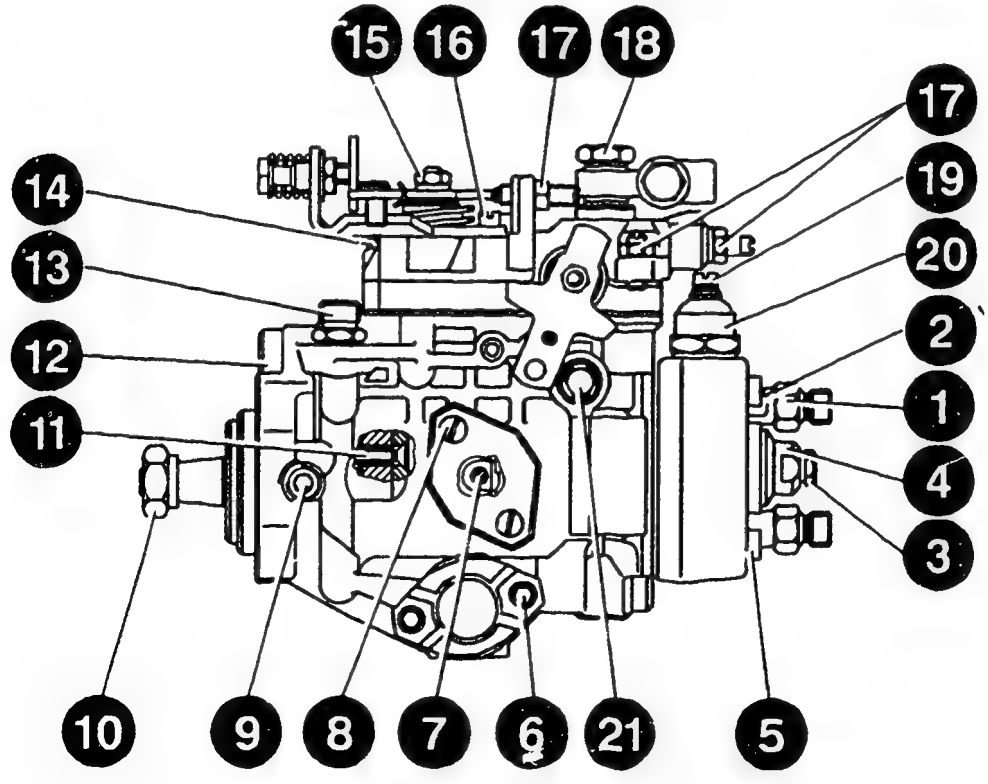


KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

10 =	Hexagon nut Thread M12 / taper 17 mm Part no. 2 915 011 011	60..70 Nm
	Hexagon nut Thread M14x1.5 / taper 20 Part no. 2 915 021 004 Part no. 1 463 300 316	90..95 Nm
	Flat nut Thread M14x1.5 / taper 20 Part no. 2 915 042 106	70..75 Nm
11 =	Hexagon bolt, supply pump	2.. 4 Nm
12 =	Slotted hexagon nut	22..30 Nm

Continue: A19/1 Fig.: A18/2

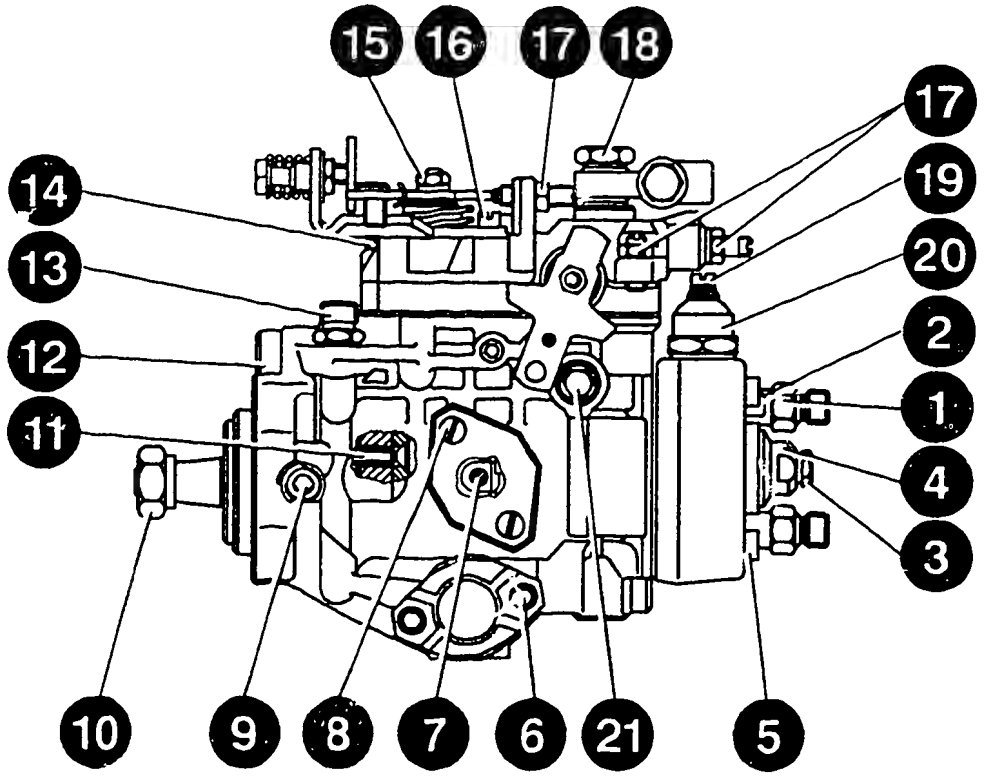


KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

13 =	Tube fitting / or inlet-union screw	20..30 Nm
14 =	Hexagon-socket-head cap screw / fillister-head screw	7..10 Nm
15 =	Fastening nut for all control levers	5..10 Nm
16 =	Hexagon-socket-head cap screw / fillister-head screw	7..10 Nm
17 =	Hexagon nut	6.. 9 Nm
18 =	Overflow restrictor	Nm
19 =	Hexagon nut / fillister-head screw	1.5..2.5 Nm
20 =	Solenoid valve	15..25 Nm
21 =	Slotted shoulder screw	10..15 Nm

Continue: A20/1 Fig.: A19/2

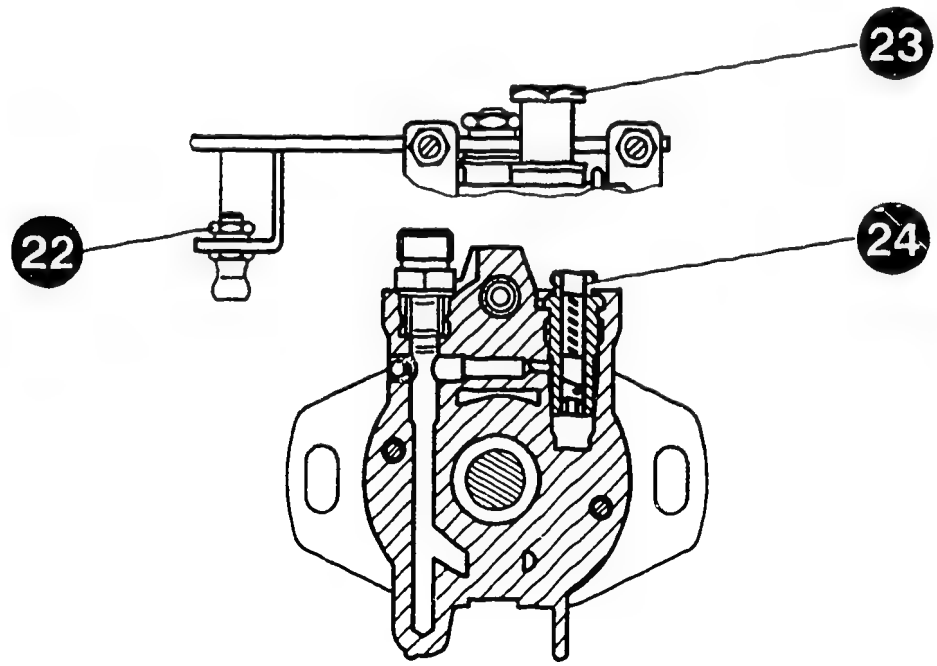


KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

22 =	Hexagon nut	3.. 5 Nm
23 =	Inlet-union screw with attached inlet union	20..30 Nm
24 =	Pressure regulator	7..10 Nm

Continue: A21/1 Fig.: A20/2

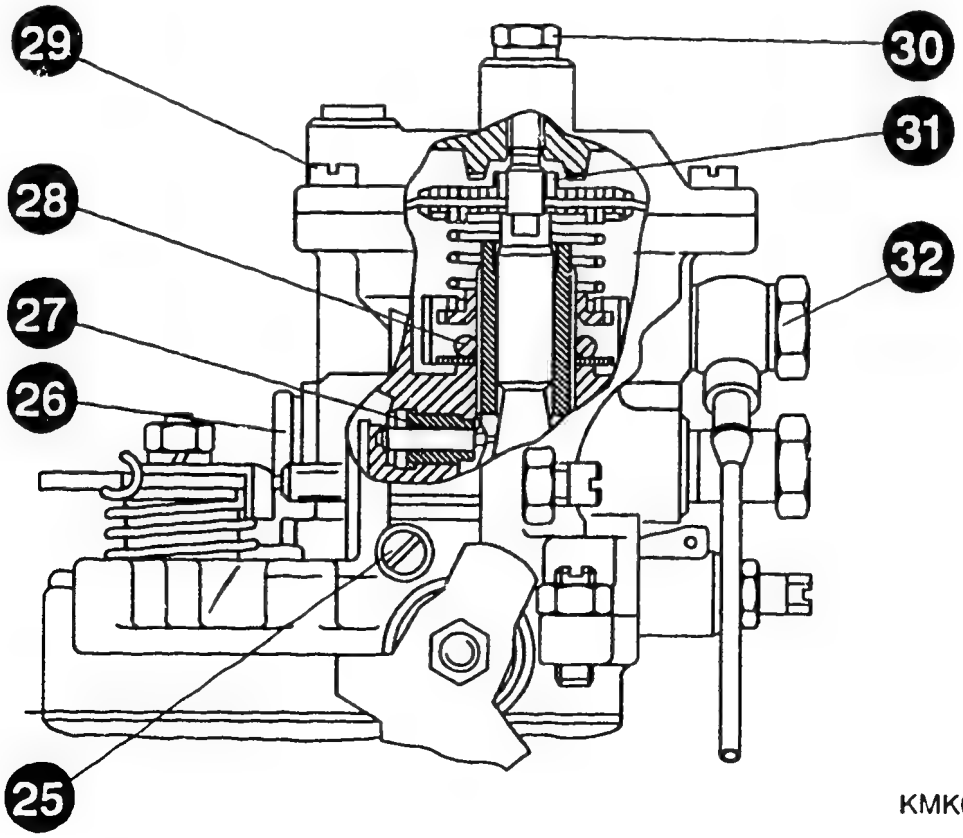


KMK02239

TIGHTENING TORQUES FOR PUMP WITH LDA HOUSING

25 =	Fillister-head screw	6.. 8 Nm
26 =	Screw plug	12..16 Nm
27 =	Slotted nut	8..12 Nm
28 =	Hexagon nut	25..35 Nm
29 =	Fillister-head screw / Torx hexagon nut	5.. 8 Nm
30 =	Hexagon nut	6.. 9 Nm
31 =	Hexagon nut	3.5..4.5Nm
32 =	Bleeder screw	10..15 Nm

Continue: A22/1 Fig.: A21/2

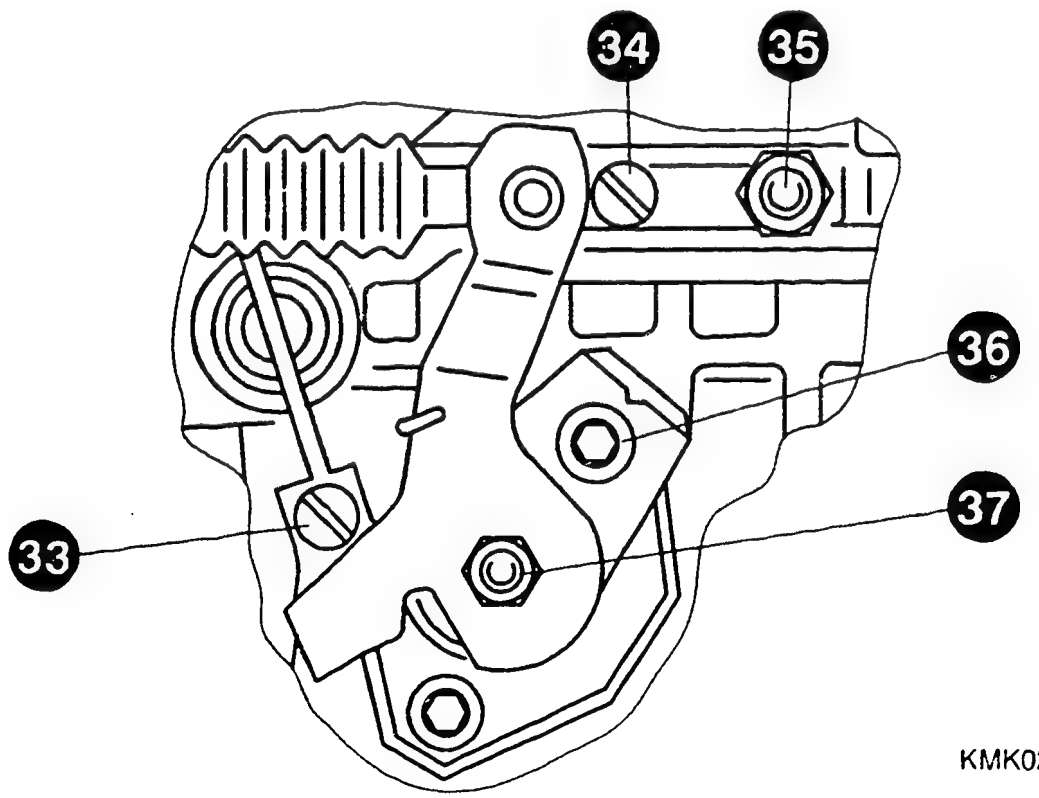


KMK02909

TIGHTENING TORQUES FOR PUMP WITH ROLLER RING KSB COOLANT TEMPERATURE-CONTROLLED

33 =	Fillister-head screw	3.0..4.5 Nm
34 =	Fillister-head screw	0.5..1.0 Nm
35 =	Hexagon nut	3.5..4.5 Nm
36 =	Hexagon-socket-head cap screw	6.. 9 Nm
37 =	Hexagon nut	5..10 Nm

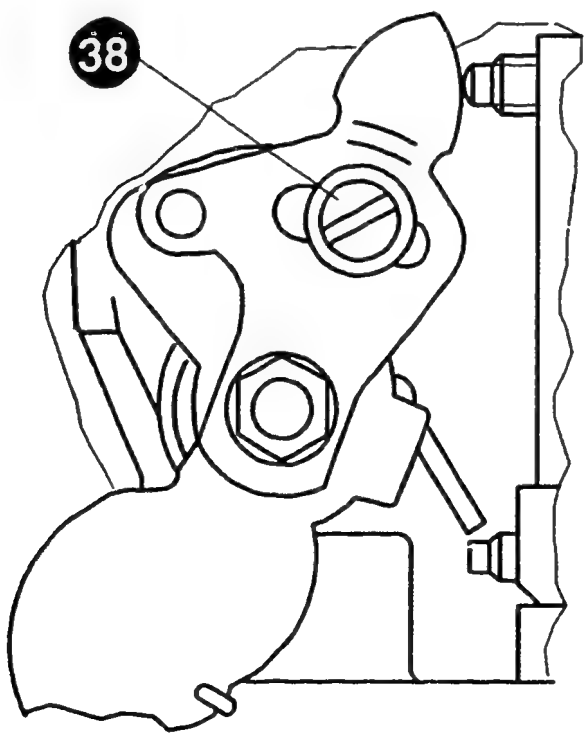
Continue: A23/1 Fig.: A22/2



TIGHTENING TORQUES FOR PUMP WITH TWO-PIECE SPEED-CONTROL LEVER

38 = Hexagon nut/fillister-head screw 6.. 9 Nm

Continue: A24/1 Fig.: A23/2

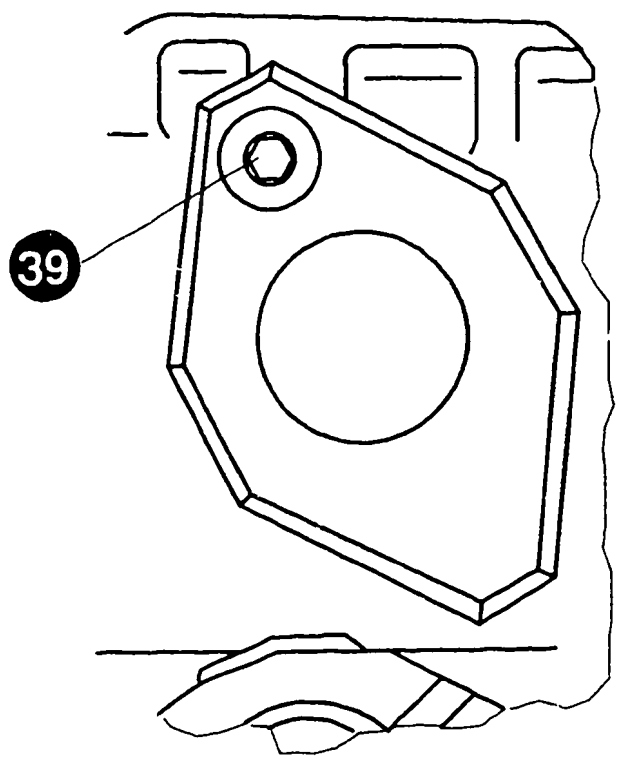


KMK02911

TIGHTENING TORQUES FOR PUMP WITH BLEEDER SCREW

39 = Bleeder screw	3.. 5 Nm

Continue: A25/1 Fig.: A24/2

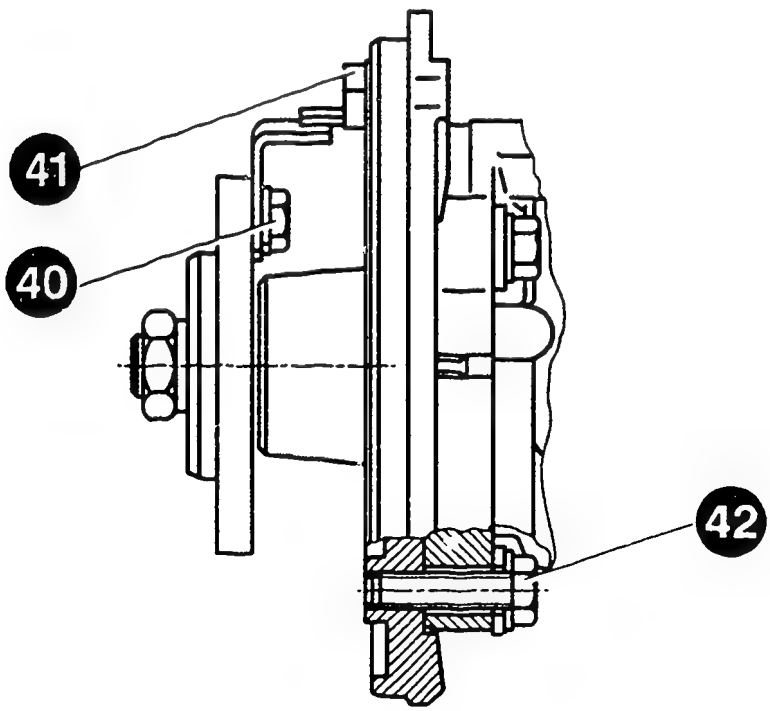


KMK02912

TIGHTENING TORQUES FOR PUMP WITH COUPLING HALF AND FLANGE

40 = Hexagon bolt	7..10 Nm
41 = Hexagon-socket-head cap screw	2.. 3 Nm
42 = Hexagon bolt	16..24 Nm

Continue: A26/1 Fig.: A25/2

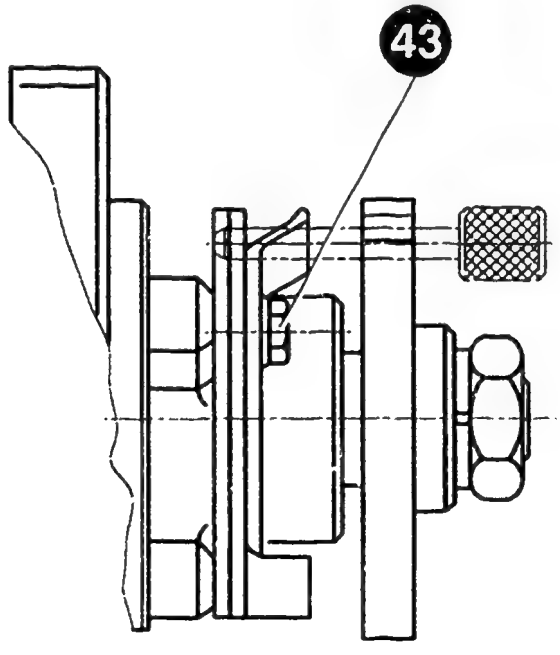


KMK02913

TIGHTENING TORQUES FOR PUMP WITH COUPLING HALF AND FLANGE

43 = Hexagon bolt
Notched plate 4.0...6.0 Nm

Continue: A27/1 Fig.: A26/2

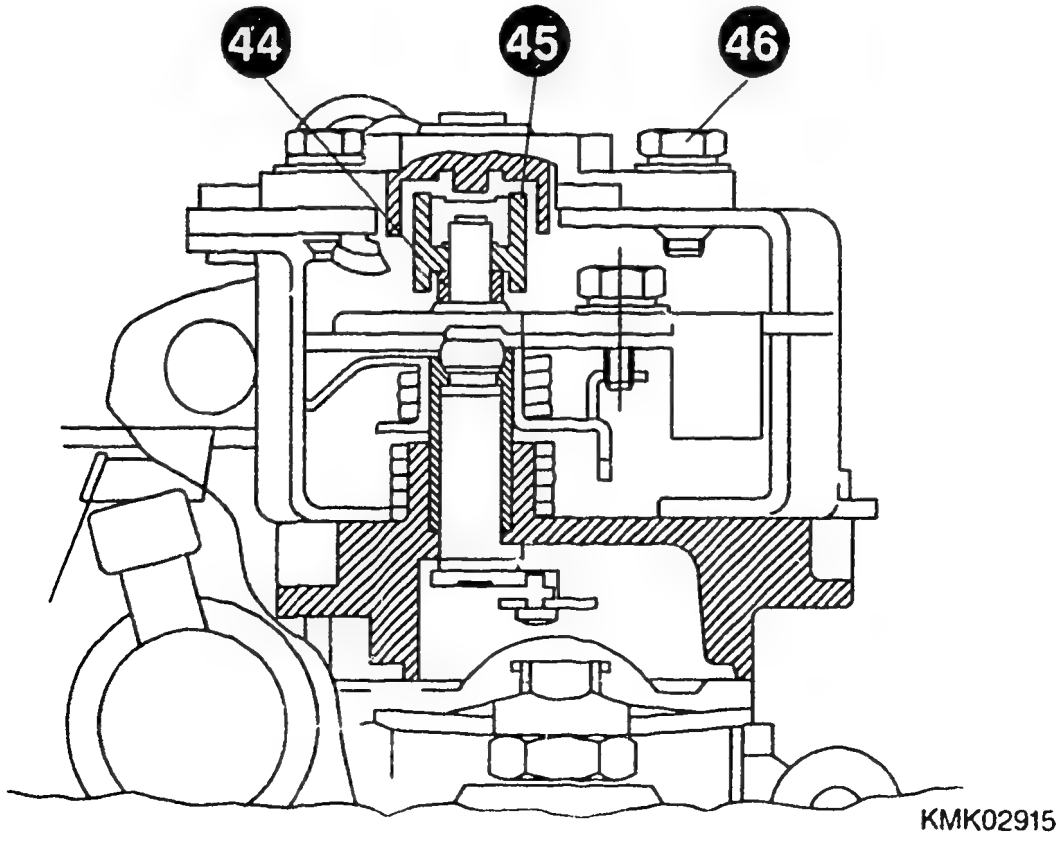


KMK02914

TIGHTENING TORQUES FOR PUMP WITH CONTROL-LEVER POTENTIOMETER

44 = Hexagon nut	7..10 Nm
45 = Round nut	5.. 8 Nm
46 = Hexagon nut	5.. 8 Nm

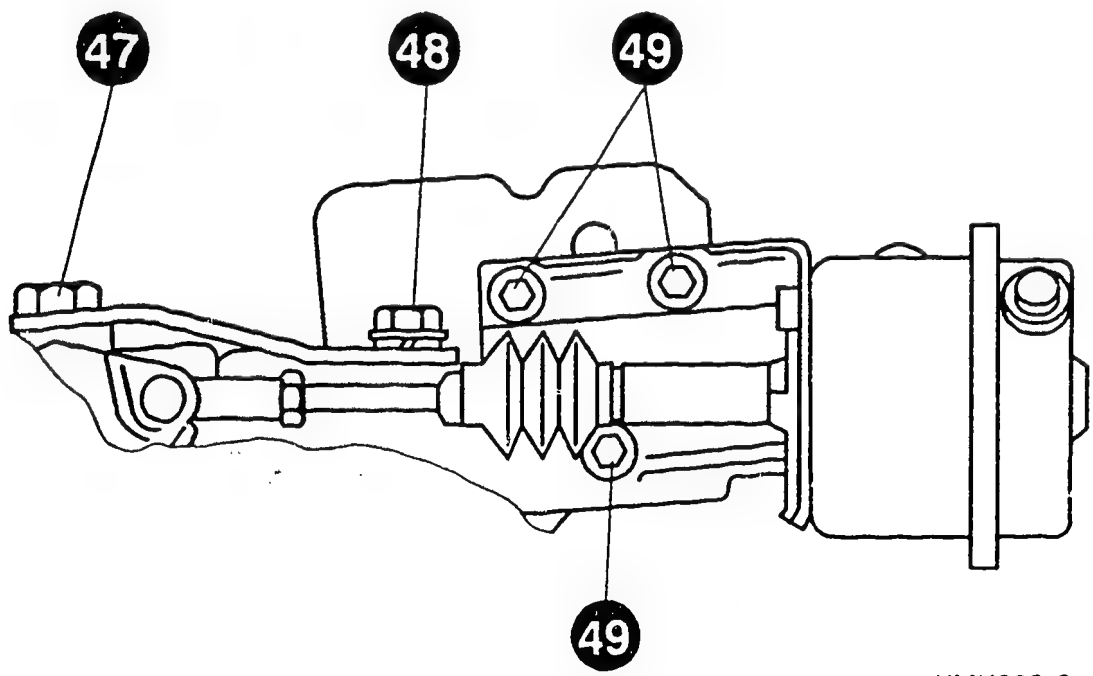
Continue: A28/1 Fig.: A27/2



TIGHTENING TORQUES FOR PUMP WITH EXTERNAL LDA

47 =	Hexagon bolt	10..15 Nm
48 =	Hexagon bolt	6.. 9 Nm
49 =	Hexagon-socket-head cap screw	8..10 Nm

Continue: B01/1 Fig.: A28/2

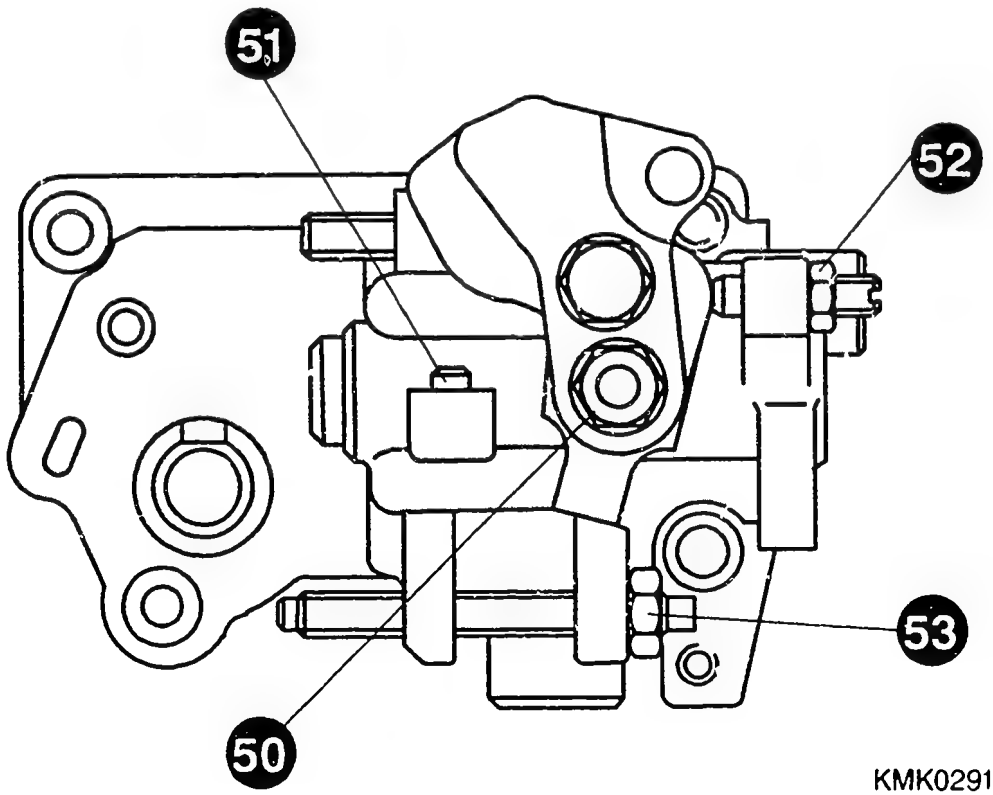


KMK02916

TIGHTENING TORQUES FOR PUMP WITH EXTERNAL LDA

50 =	Hexagon nut	M6	6.0...9.0 Nm
51 =	Fillister-head screw	M5	2.0...4.0 Nm
52 =	Hexagon nut	M6	6.0...9.0 Nm
53 =	Hexagon nut	M6	6.0...9.0 Nm

Continue: B02/1 Fig.: B01/2

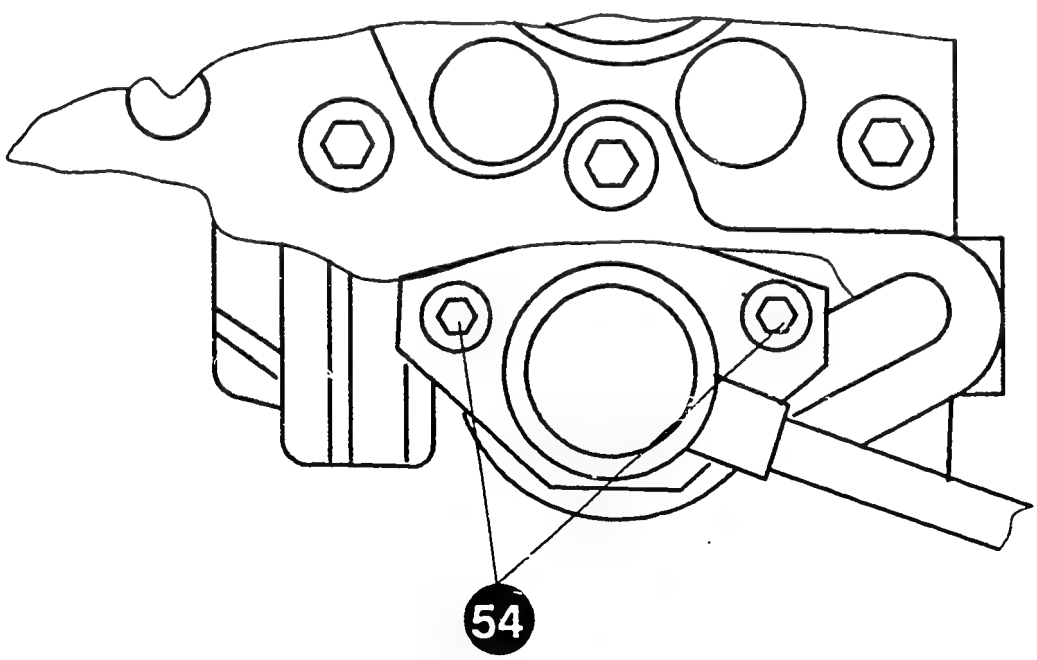


KMK02917

TIGHTENING TORQUES FOR PUMP WITH FREQUENCY VALVE

54 = Fillister-head / Torx screw 10..14 Nm

Continue: B03/1 Fig.: B02/2

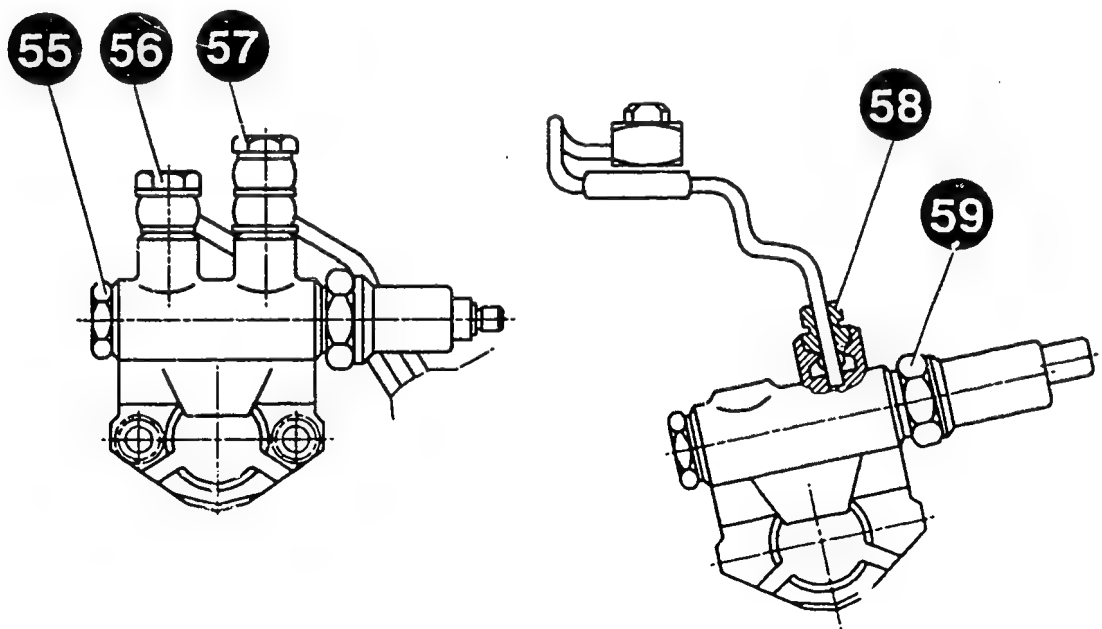


KMK02918

TIGHTENING TORQUES FOR PUMP WITH HYDRAULIC KSB

55 = Valve insert	10..15 Nm
56 = Inlet-union screw	8..12 Nm
57 = Inlet-union screw	8..12 Nm
58 = Retaining screw	6..10 Nm
59 = Thermo-element	20..25 Nm

Continue: B04/1 Fig.: B03/2

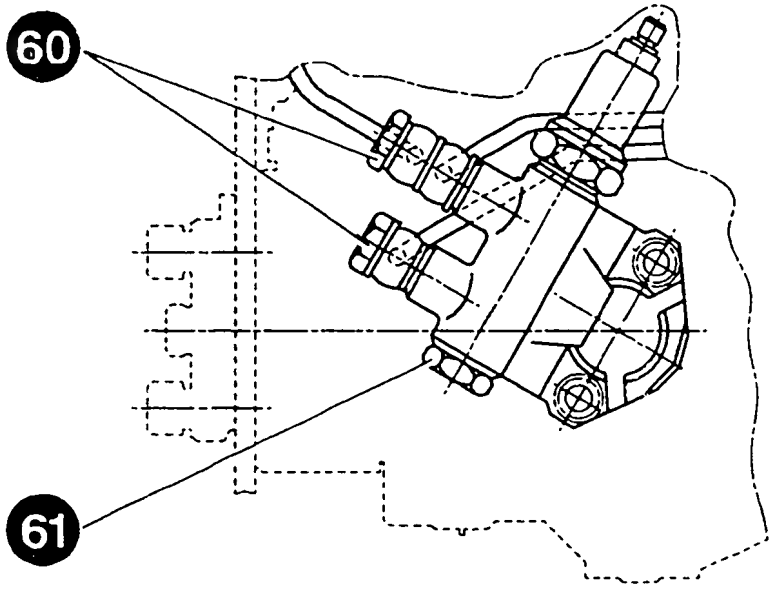


KMK02919

TIGHTENING TORQUES FOR PUMP WITH HYDRAULIC KSB

60 = Inlet-union screw 8.0...11.0 Nm
61 = Valve insert 10.0...15.0 Nm

Continue: B05/1 Fig.: B04/2

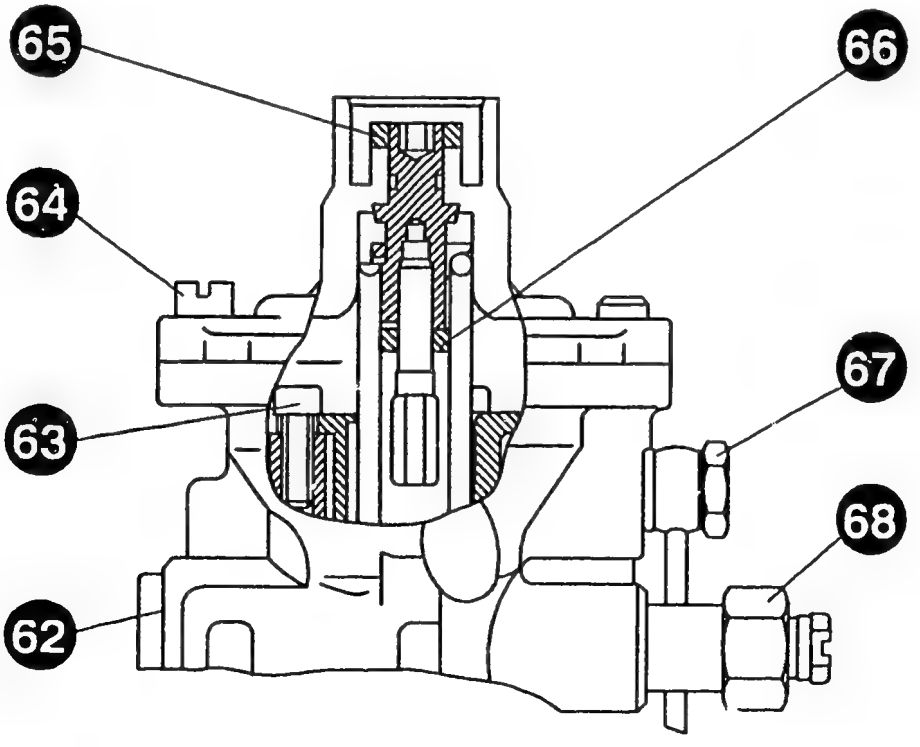


KMK02920

TIGHTENING TORQUES FOR PUMP WITH HYDRAULIC TORQUE CONTROL

62 = Screw plug	12..16 Nm
63 = Hexagon-socket-head cap screw	3.. 8 Nm
64 = Fillister-head screw	5.. 8 Nm
65 = Hexagon nut	6.. 9 Nm
66 = Hexagon nut	3.. 5 Nm
67 = Inlet-union screw	8..12 Nm
68 = Inlet-union screw	29..30 Nm

Continue: B06/1 Fig.: B05/2



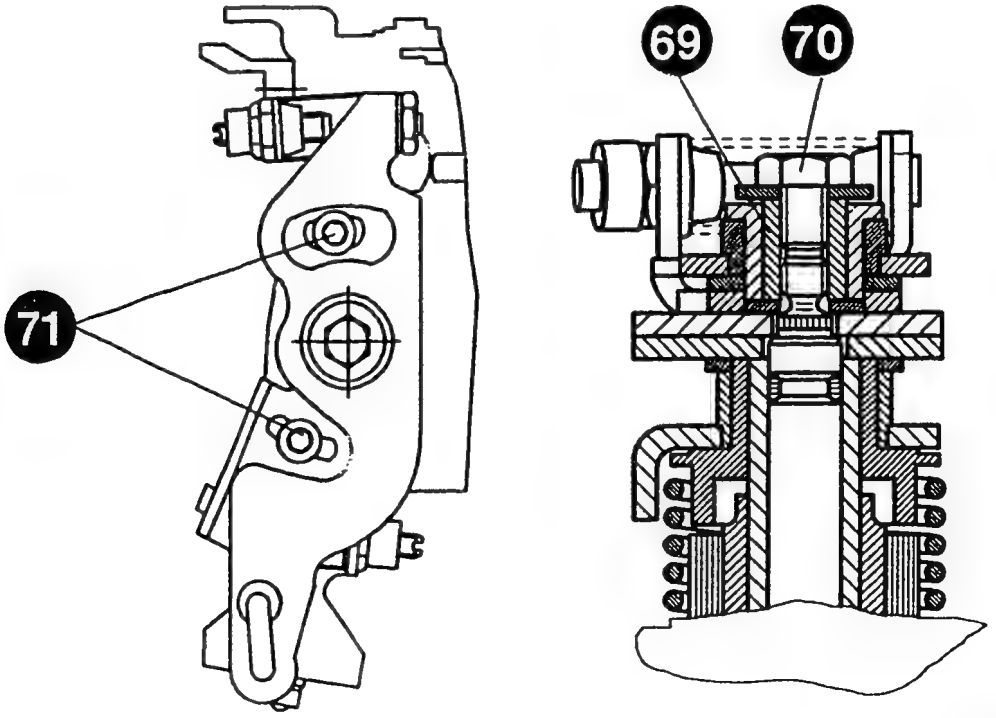
KMK02921

TIGHTENING TORQUES FOR PUMP WITH MECHANICAL POWER ON/OFF DAMPER (MLD)

69 = Connecting nut	6.0..10.0 Nm
70 = Hexagon bolt	2.5.. 4.5 Nm
71 = Torx screw	10.0..14.0 Nm

Note:
Always pay attention to tightening torques. If the hexagon bolt is tightened more than the connecting nut, the entire lever assembly will be released on disassembly (due to loosening of the connecting nut). The pressure springs pretensioned between the levers could jump off in an uncontrolled manner.

Continue: B07/1 Fig.: B06/2



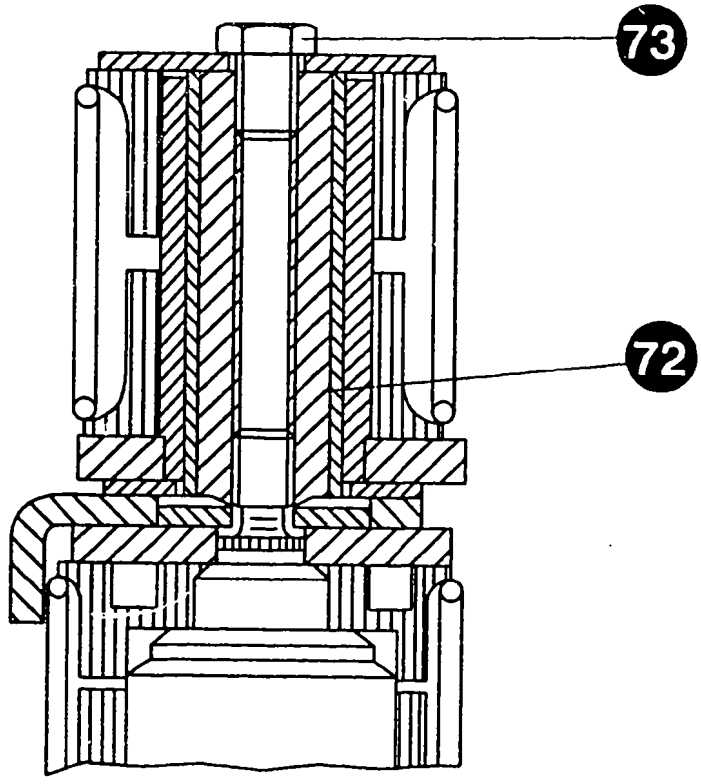
KMK02922

TIGHTENING TORQUES FOR PUMP WITH SPRING-ACTUATED POWER ON/OFF DAMPER (FLD)

72 = Connecting nut 6.0..10.0 Nm
73 = Hexagon bolt 2.5.. 4.5 Nm

Always pay attention to tightening torques. If the hexagon bolt is tightened more than the connecting nut, the entire lever assembly will be released on disassembly (due to loosening of the connecting nut). The pressure springs pretensioned between the levers could jump off in an uncontrolled manner.

Continue: B08/1 Fig.: B07/2

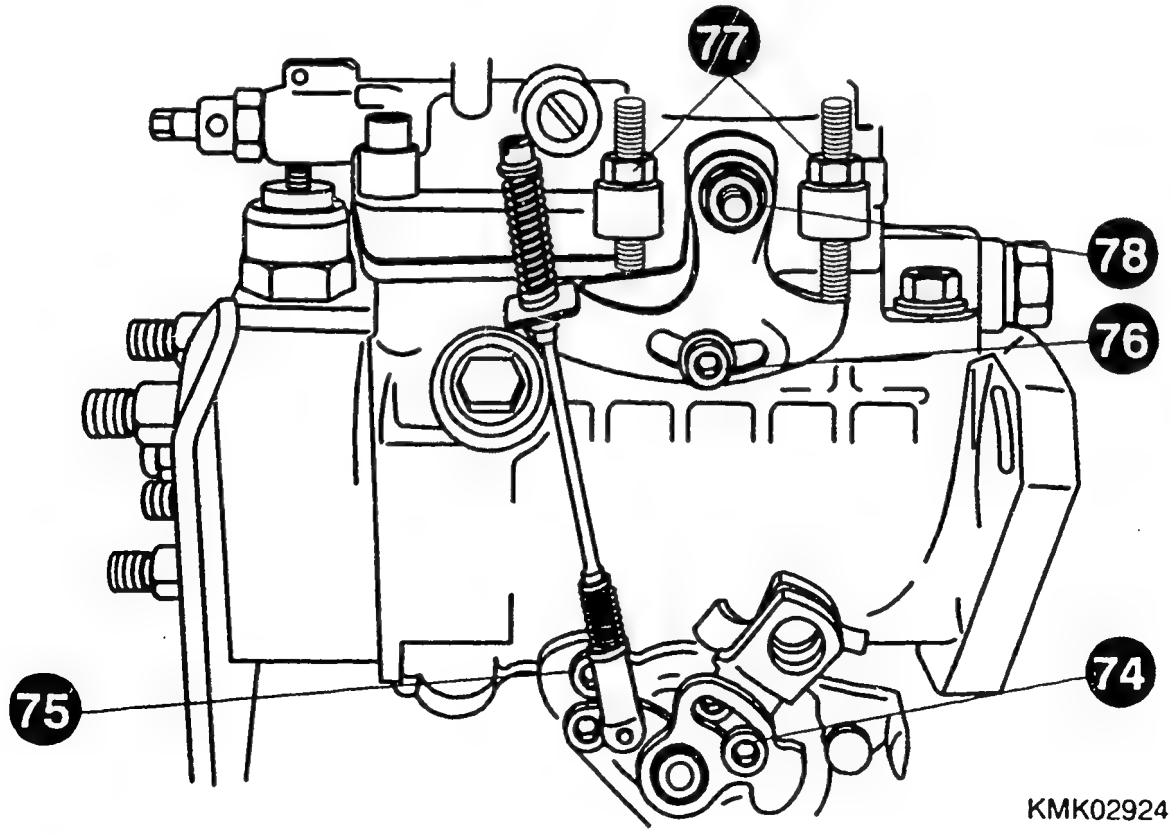


KMK02923

TIGHTENING TORQUES FOR PUMP WITH TIMING DEVICE KSB COUPLED WITH LFG LEVER

74 =	Basic lever Fastening screw	8.0...12.0 Nm
75 =	Hexagon-socket-head cap screw	3.0... 5.0 Nm
76 =	Fastening screw LFG stop lever	2.0... 3.0 Nm
77 =	Hexagon nut M6	6.0... 9.0 Nm
78 =	Hexagon nut M5	4.0... 6.0 Nm

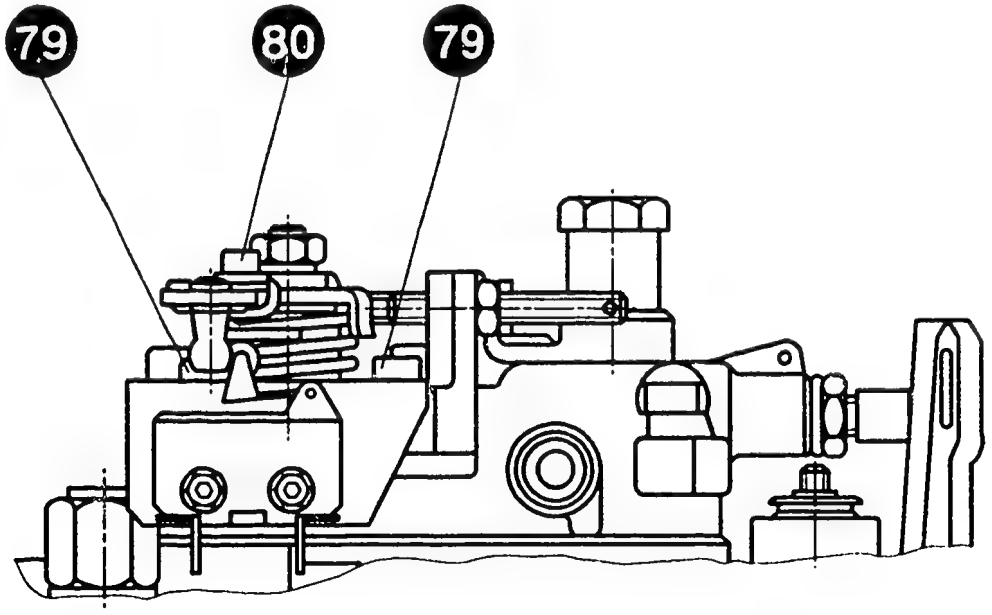
Continue: B09/1 Fig.: B08/2



TIGHTENING TORQUES FOR PUMP WITH MICROSWITCH

79 = Torx screw	7.0...10.0	Nm
80 = Torx screw	3.0 5.0	Nm

Continue: B10/1 Fig.: B09/2

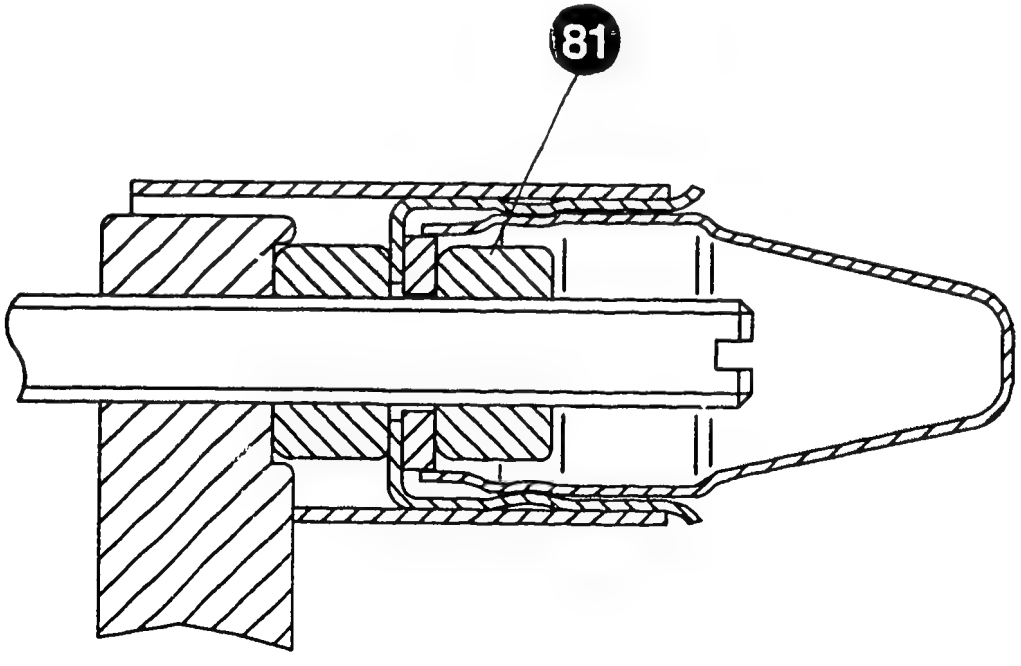


KMK02925

TIGHTENING TORQUES FOR PUMP SEALING CAP AT RATED-SPEED ADJUSTING SCREW

81 = Hexagon nut M6 3.0...5.0 Nm

Continue: B11/1 Fig.: B10/2

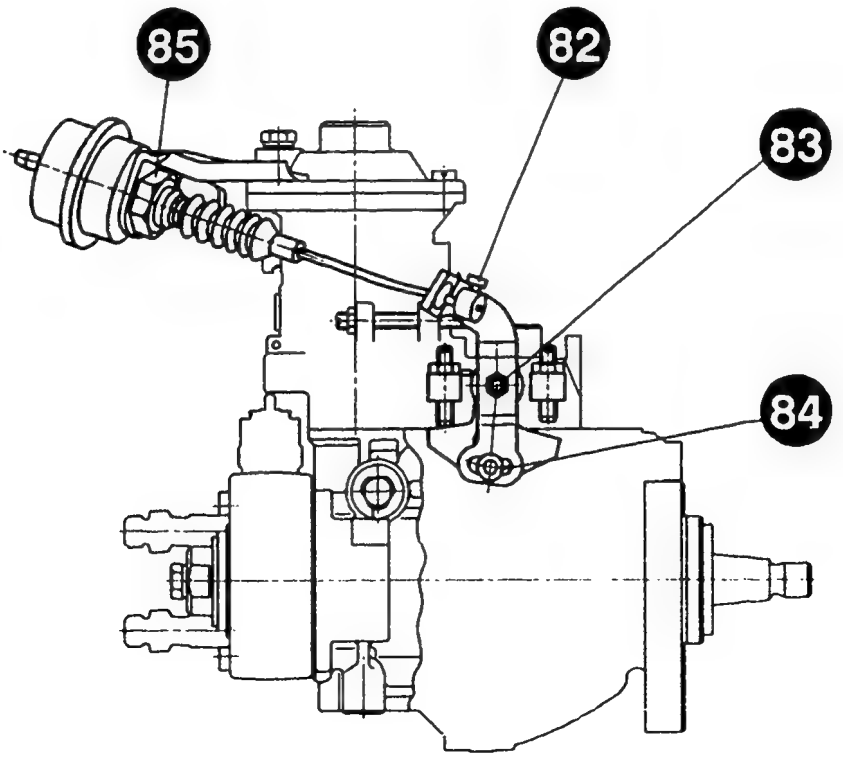


KMK02926

TIGHTENING TORQUES FOR PUMP WITH PNEUMATIC IDLE INCREASE (PLA)

82 = Slotted screw	2.0...3.0 Nm
83 = Hexagon bolt	3.0...5.0 Nm
84 = Hexagon bolt	5.0...7.0 Nm
85 = Fastening nut	20...25 Nm

Continue: B12/1 Fig.: B11/2

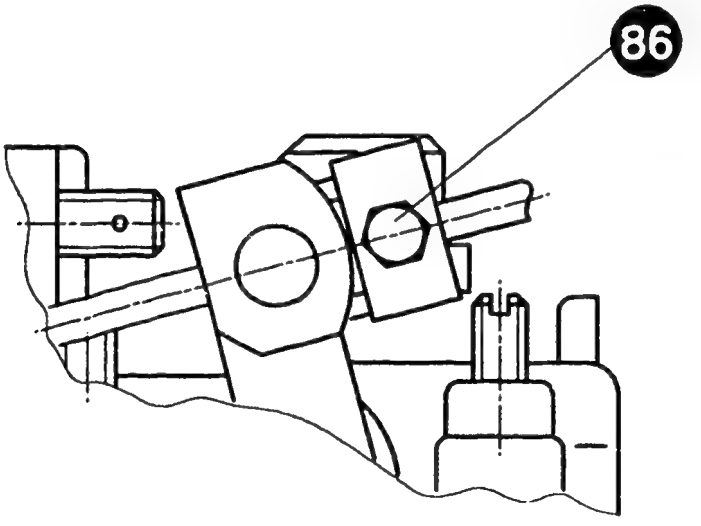


KMK02927

TIGHTENING TORQUES FOR PUMP WITH TEMPERATURE-DEPENDENT IDLE INCREASE (TLA)

86 = Hexagon bolt 2.0...3.0 Nm

Continue: B13/1 Fig.: B12/2

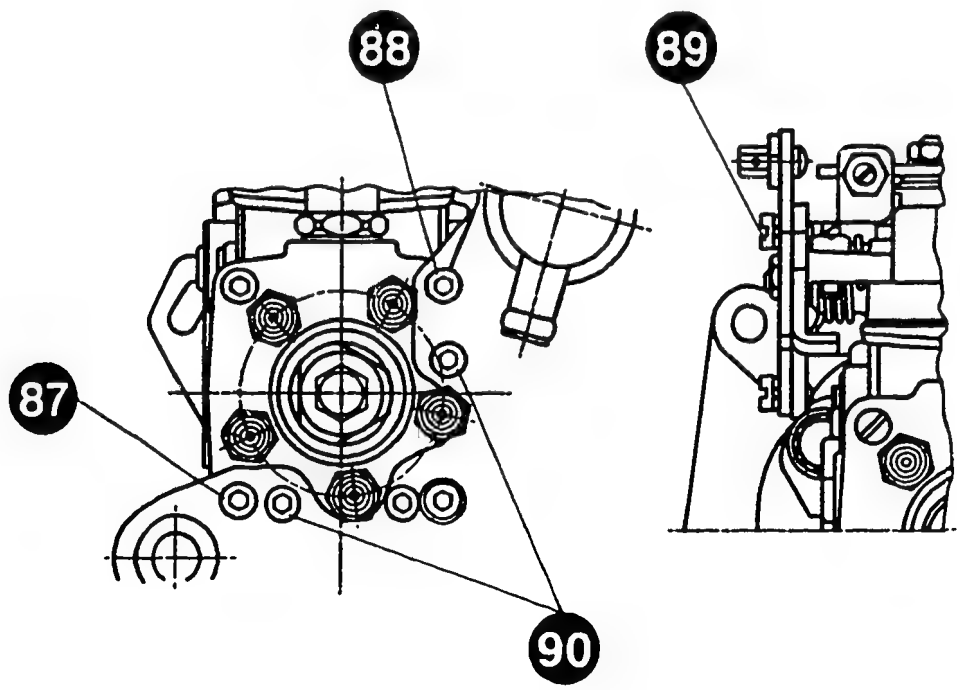


KMK02928

TIGHTENING TORQUES FOR PUMP WITH MOUNTING PLATE

87 =	Torx screw	10...14 Nm
88 =	Torx screw	10...14 Nm
89 =	Fillister-head screw	3... 5 Nm
90 =	Hexagon-socket-head cap screw	7...10 Nm

Continue: B14/1 Fig.: B13/2

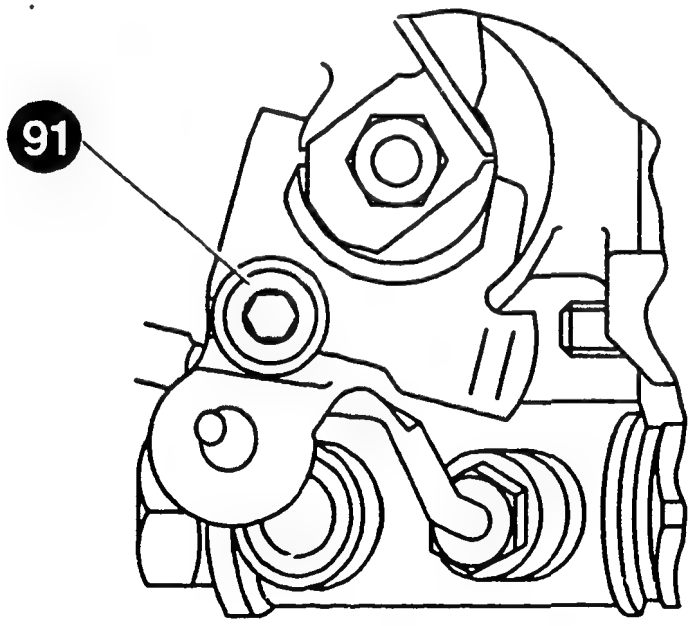


KMK03005

TIGHTENING TORQUES FOR PUMP WITH ADDITIONAL LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

91 = Fastening screw 6... 9 Nm

Continue: B15/1 Fig.: B14/2

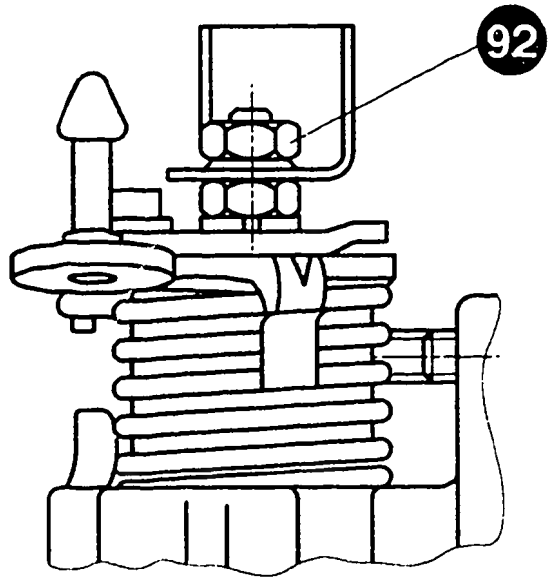


KMK02929

TIGHTENING TORQUES FOR PUMP WITH STOP BRACKET FOR SWITCHING-VALVE ADJUSTMENT

92 = Hexagon nut 5...10 Nm

Continue: B16/1 Fig.: B15/2

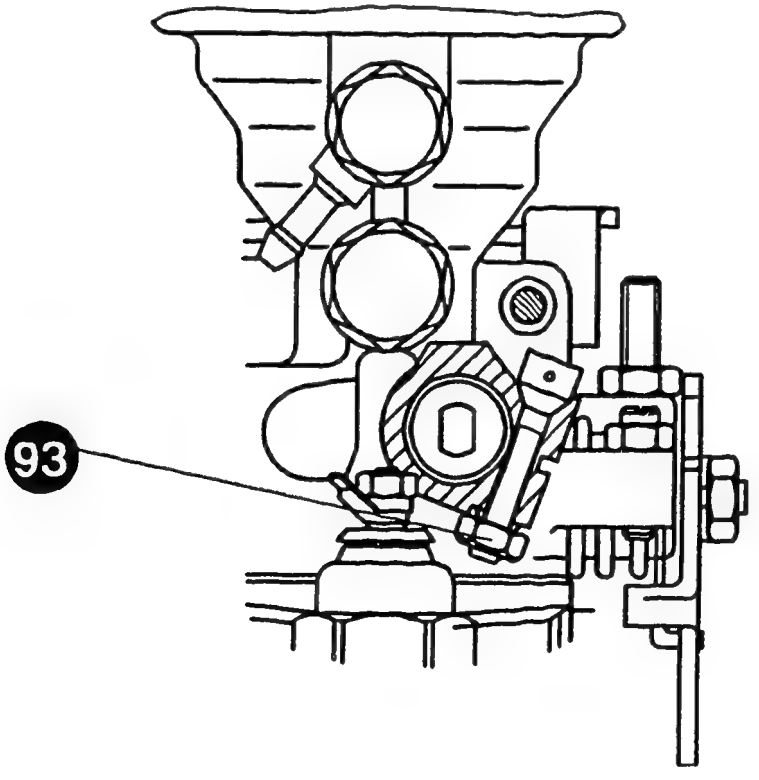


KMK02930

TIGHTENING TORQUES FOR PUMP WITH FULL-LOAD ADJUSTER

93 = Hexagon nut 2.5..3.5 Nm

Continue: B17/1 Fig.: B16/2

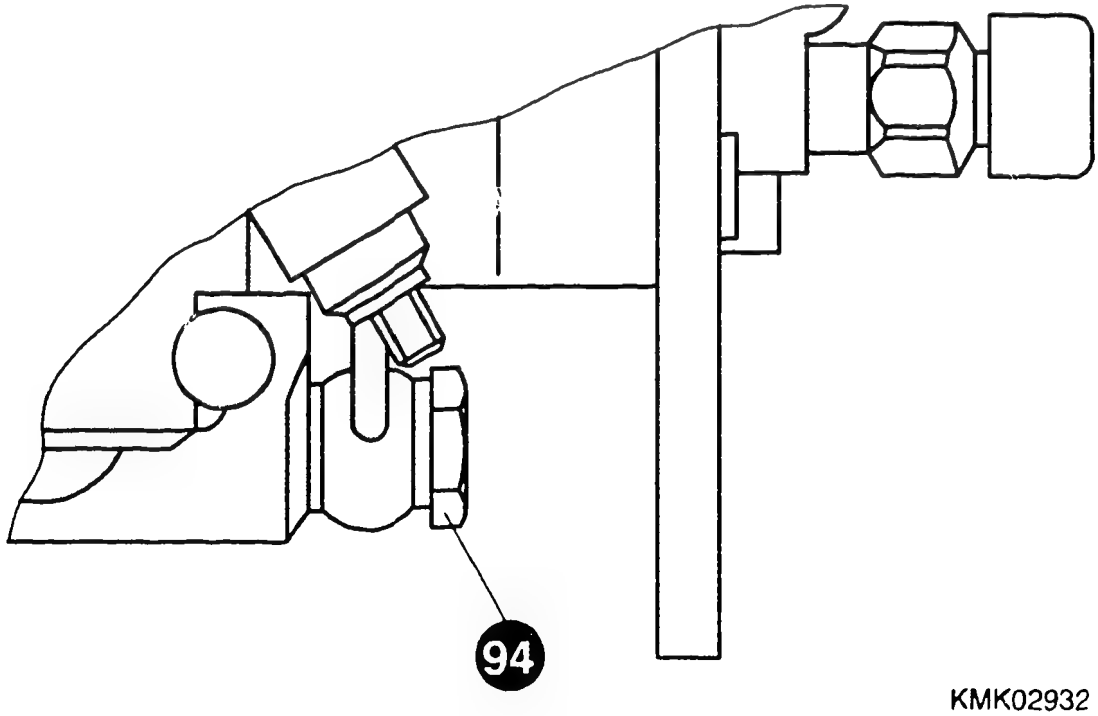


KMK02931

TIGHTENING TORQUES FOR PUMP WITH RETURN LINE FROM HBA

94 = Inlet-union screw — 8...11 Nm

Continue: B18/1 Fig.: B17/2

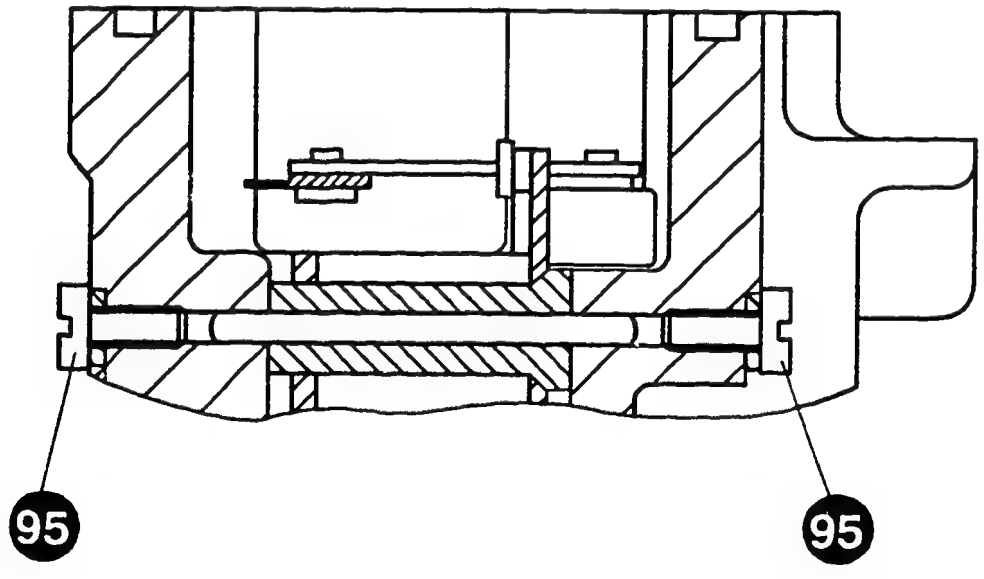


KMK02932

TIGHTENING TORQUES FOR PUMP WITH LDA

95 = Fillister-head screw 6... 8 Nm

Continue: B19/1 Fig.: B18/2

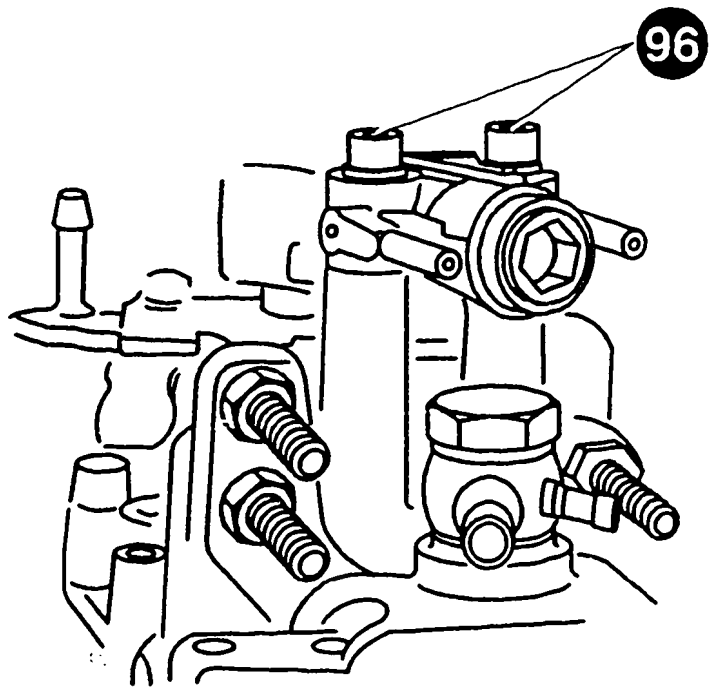


KMK02933

TIGHTENING TORQUES FOR PUMP WITH SWITCHING VALVE

96 = Torx screw M5 2... 3 Nm

Continue: B20/1 Fig.: B19/2

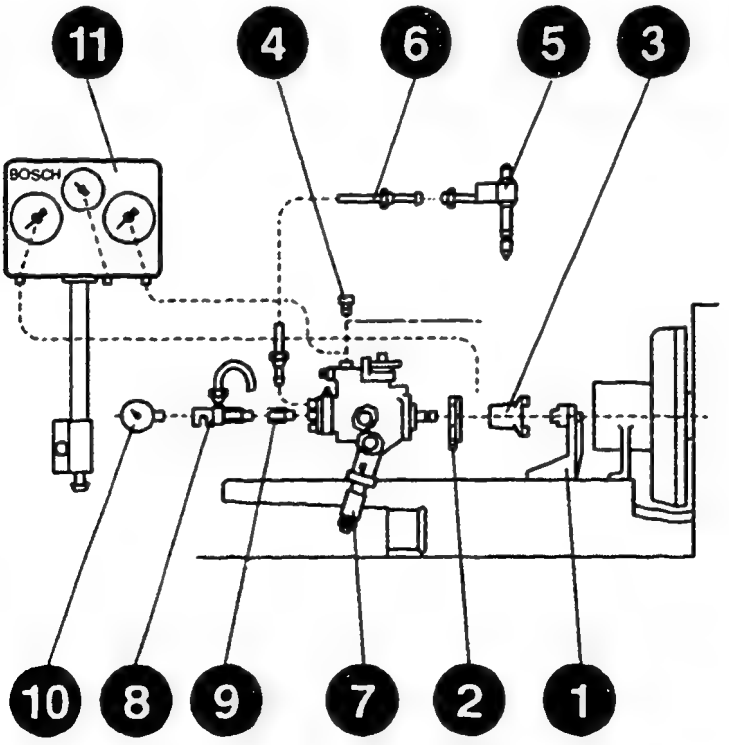


KMK02934

TEST SET-UP
* Test-bench accessories

1 = Universal clamping bracket
2 = Clamping flange
3 = Coupling half
4 = Overflow restriction (as per service-parts list) or test-specification sheet
5 = Calibrating nozzle-holder assembly
6 = Test-pressure line
7 = Timing-device measuring instrument
8 = Prestroke measuring device
9 = Adapter
10= Dial indicator
11= Test device for inlet pressure and pump interior pressure (if necessary)

Continue: B21/1 Fig.: B20/2

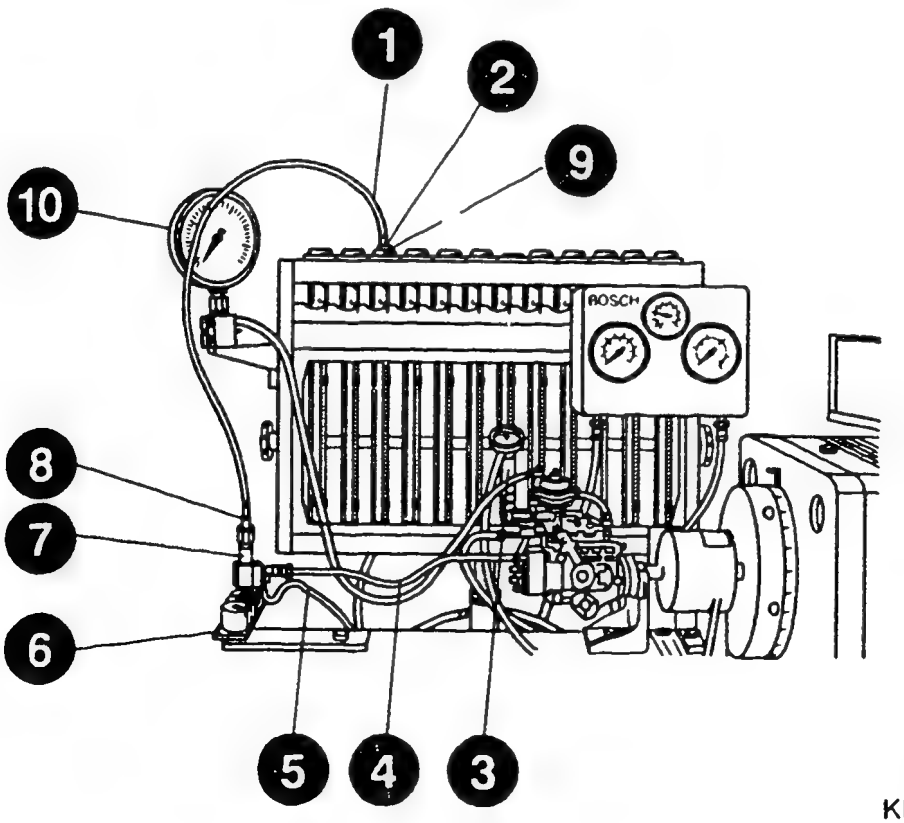


KMK02253

DIAGRAM OF VE LINES WITH ON-ENGINE TEST EQUIPMENT

1 = Connecting line
2 = Inlet-union screw (reducer with spray damper cap)
3 = Temperature indicator
4 = Test pressure line
5 = Fuel return line
6 = Nozzle-holder-assembly mount
7 = Calibrating nozzle-holder assembly
8 = Reducing coupling
9 = Reduction sleeve (only use reduction sleeves with internal grooves)
10= Pressure gauge, boost pressure test

Continue: B22/1 Fig.: B21/2

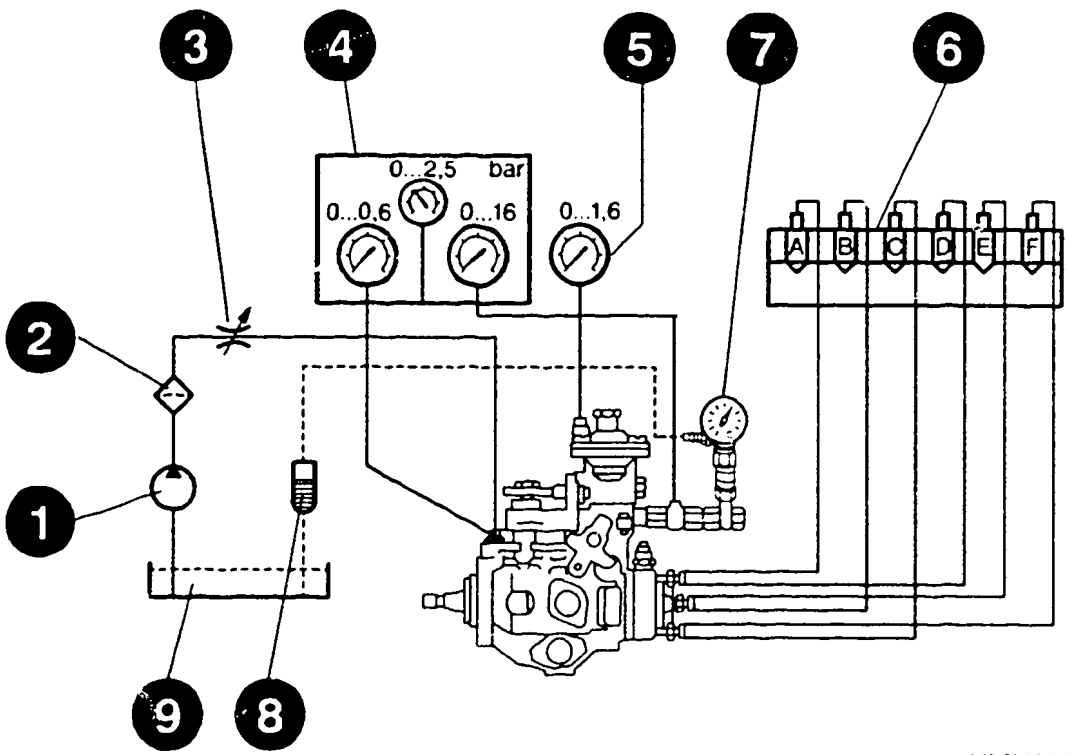


KMK02935

CONNECTION DIAGRAM

1 = Supply pump
2 = Filter
3 = Pressure regulator (inlet pressure)
4 = Test device with pressure gauge
    0...0.6 bar (0.6 kPa) inlet pressure
    0...2.5 bar (2.5 kPa) pressure
    0...16 bar (16 kPa)
    pump interior pressure
5 = Holder for nozzle-holder assembly
6 = Overflow graduate
7 = Calibrating-oil tank
8 = Temperature indicator with overflow restriction
9 = Calibrating-oil tank

Continue: C01/1 Fig.: B22/2



KMK02936

PREPARATION OF FUEL-INJECTION PUMP

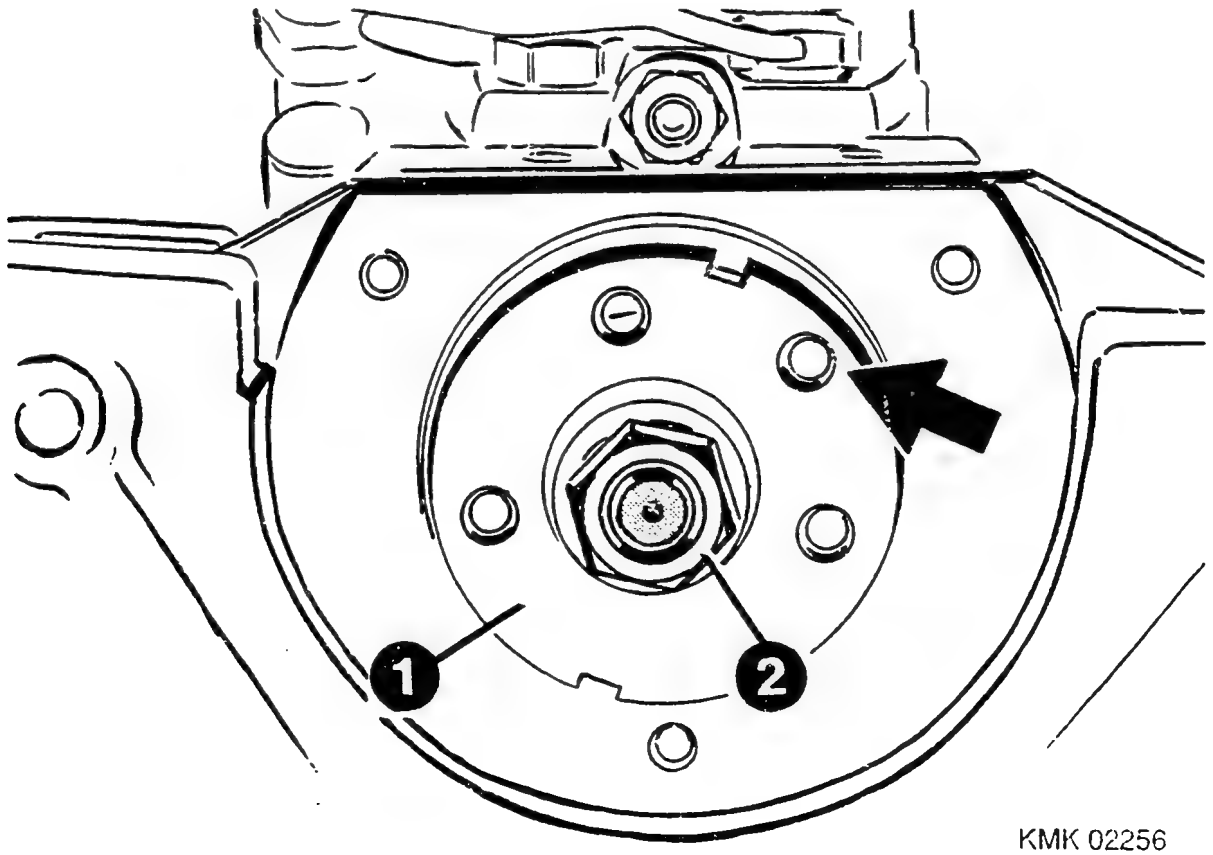
1 = Coupling half
2 = Securing nut

* Remove coupling half

If provided, remove coupling half,
loosen securing nut.

I M P O R T A N T
Do not counterhold at setting hole
(arrow).
Press off coupling half with
commercially available extractor.
Fit drive coupling and clamping flange.

Continue: C02/1 Fig.: C01/2



KMK 02256

CLAMPING FUEL-INJECTION PUMP IN POSITION

Attach pump to test bench with appropriate clamping bracket and clamping flange such that the no-play drive coupling is subjected to tensile stress.

Note:
Use is to be made of extra-long coupling in the case of pumps with load-dependent start of delivery.
Identification: Speed indicated in Section "Load-dependent start of delivery"

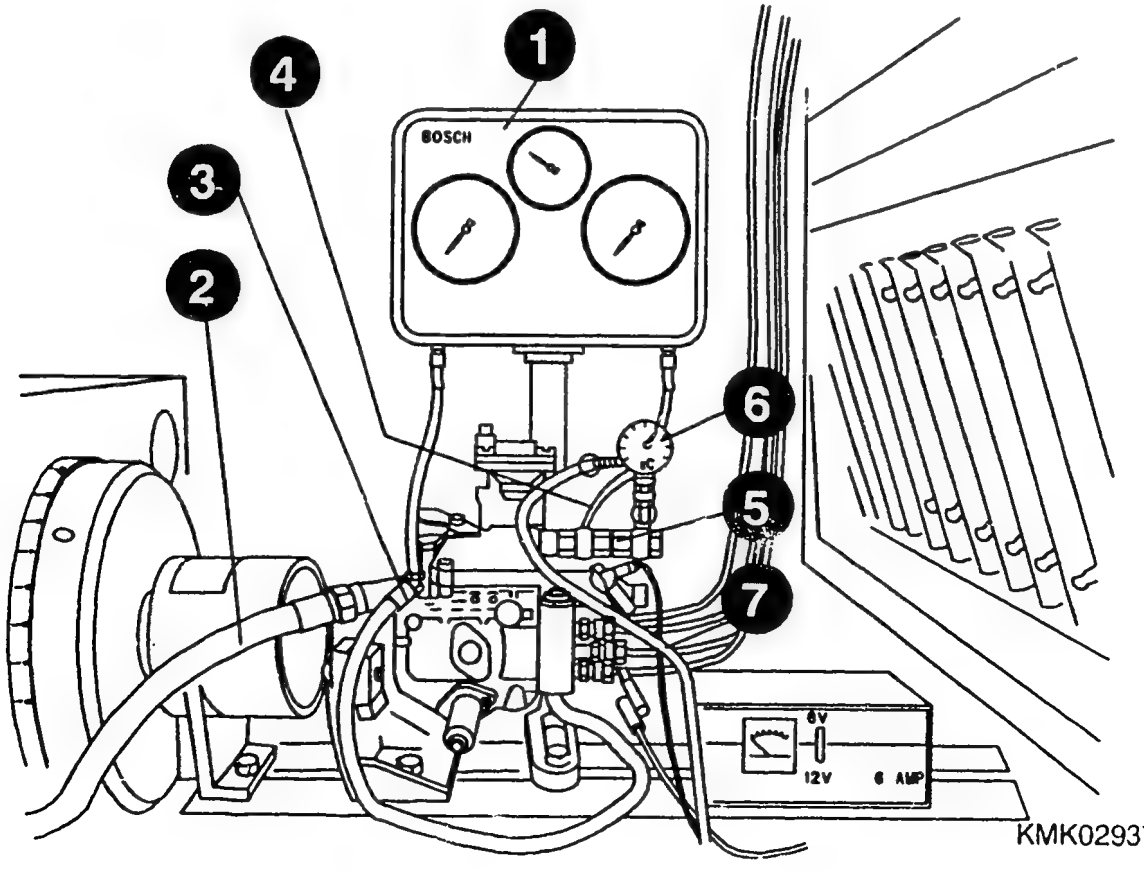
Continue: C03/1

CLAMPING INJECTION PUMP

1 = Tester
2 = Calibrating-oil inlet hose from test bench
3 = Pump inlet connection

Install tester on test bench.
Connect up calibrating-oil inlet hose to distributor pump with connector 1 683 370 011 (tester parts set) at pump inlet connection.
Connect up connecting line for pressure gauge 0..0.6 bar to pump inlet for inlet pressure measuremnt.

Continue: C04/1 Fig.: C03/2



CLAMPING FUEL-INJECTION PUMP

Select further assembly in accordance with following add-on modules:

FITTING OVERFLOW RESTRICTOR

* Adjusting pump without hydraulic torque control (HBA) C05/1

* Adjusting pump with hydraulic torque control (HBA) C07/1

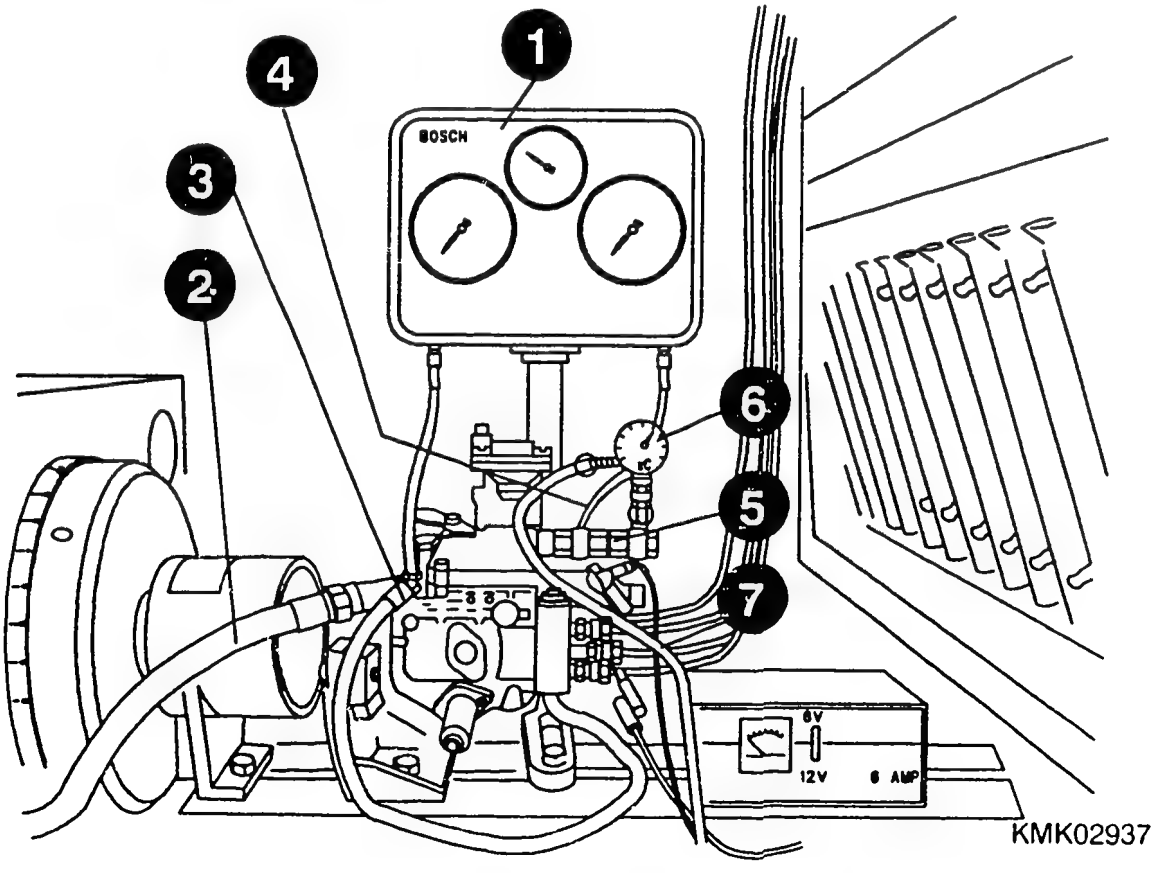
Continue: C05/1

CLAMPING FUEL-INJECTION PUMP
* Fit overflow restrictor.
Pump with no HBA

4 = Connection for measuring supply pump pressure
5 = Inlet-union screw

Connect up connecting line, pressure gauge 0...16 bar for measuring supply pump pressure at outlet upstream of overflow restrictor.
To do so, make use of inlet-union screw 1 683 456 000 and inlet union.

Continue: C06/1 Fig.: C05/2

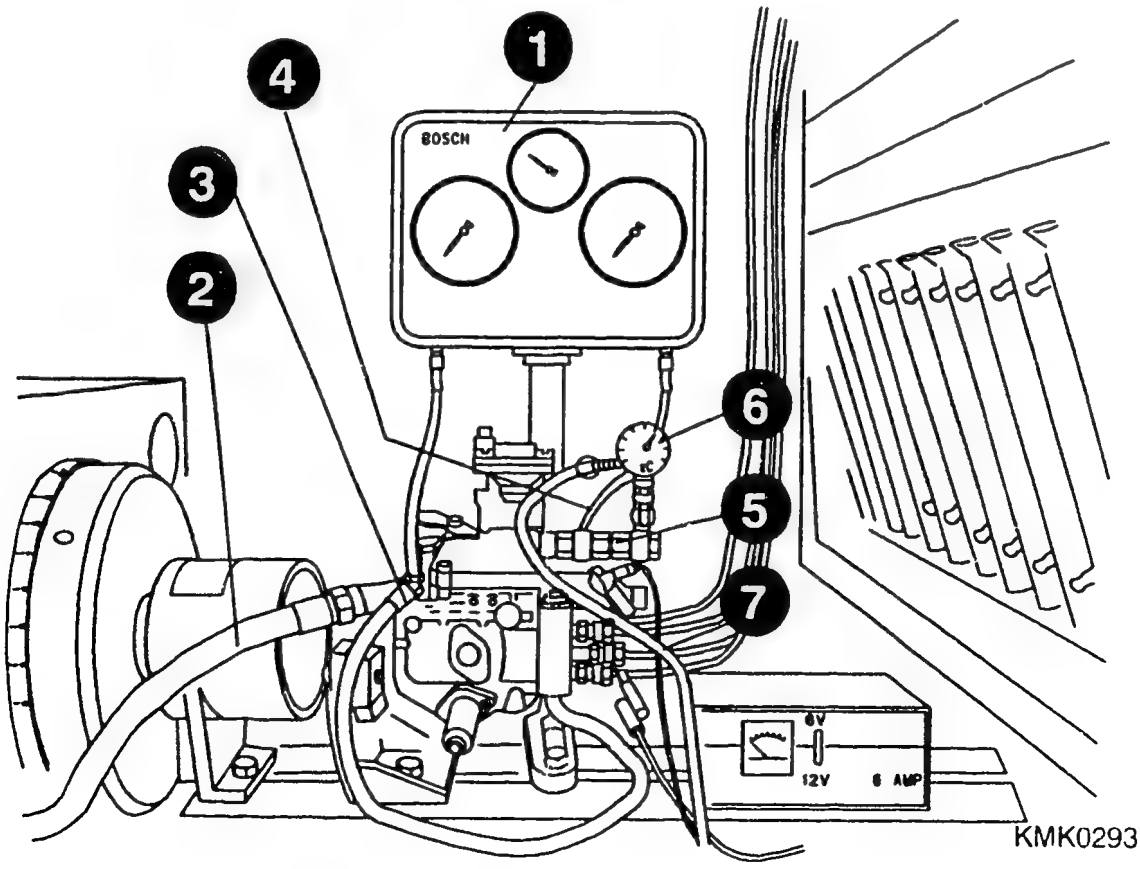


CLAMPING FUEL-INJECTION PUMP IN POSITION

6 = Temperature indicator
7 = Return line

Connect temperature indicator with overflow restriction to pump return. Route overflow back into calibrating-oil tank with plastic hose.

Continue: C07/1 Fig.: C06/2

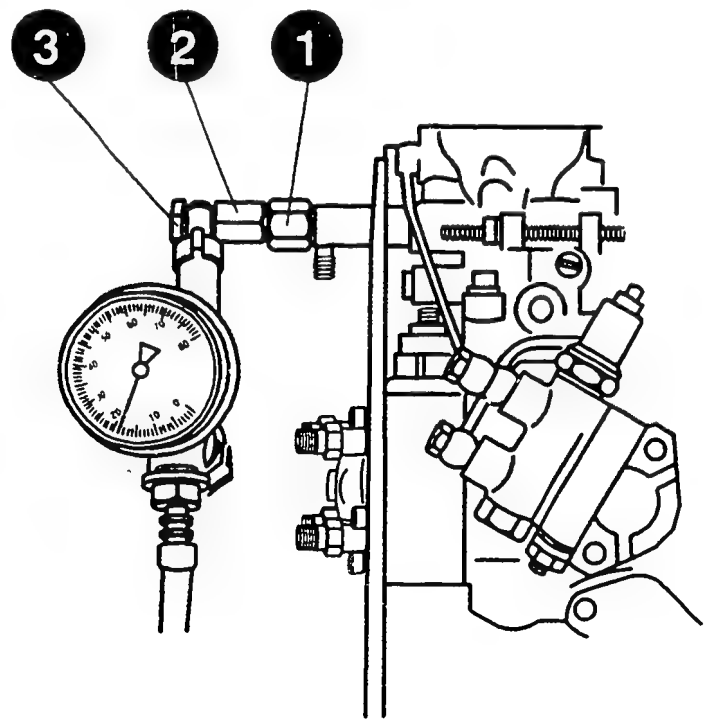


CLAMPING FUEL-INJECTION PUMP
* Fit overflow restrictor.
Pump with HBA

1 = Intermediate piece
or inlet-union screw 1 683 456 000
with inlet union 1 683 385 011
2 = Overflow restrictor
(part of pump)
3 = Inlet-union screw (not OUT screw)

Fit intermediate piece at pump return.
Screw in original overflow restrictor
with sealing ring.
Connect up inlet-union screw and
temperature indicator.

Continue: C08/1 Fig.: C07/2



KMK02938

ATTACHING TIMING-DEVICE MEASURING INSTRUMENT

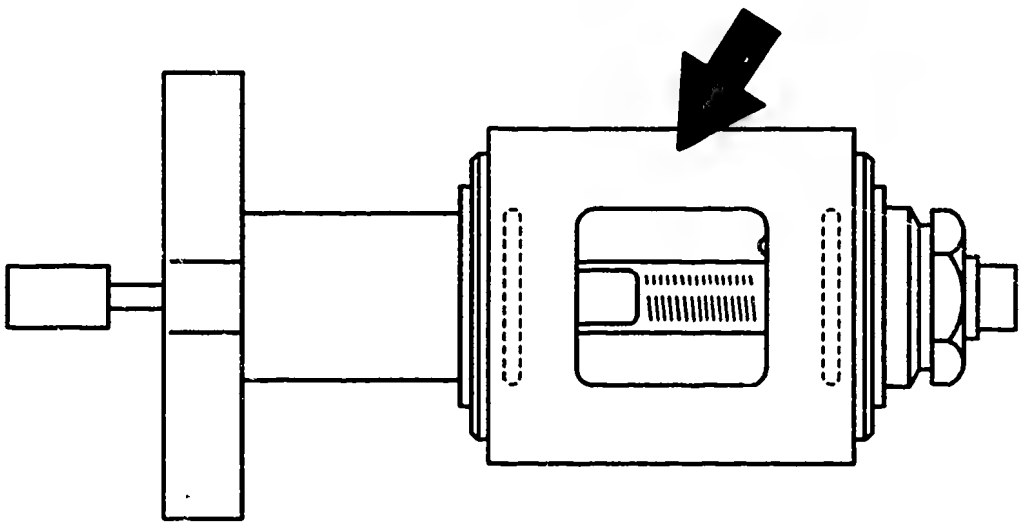
* Pump with no timing device KSB coupled with housing-fixed idle spring (LFG)

Pump with LFG and SV-KSB, continue on next Coordinate C09/1

Arrow = Aluminum sheath

Unscrew closing cover.
Attach measuring device (heavy duty version with aluminum sheath) on delivery end with O-ring.

Continue: C10/1 Fig.: C08/2



KMK02353

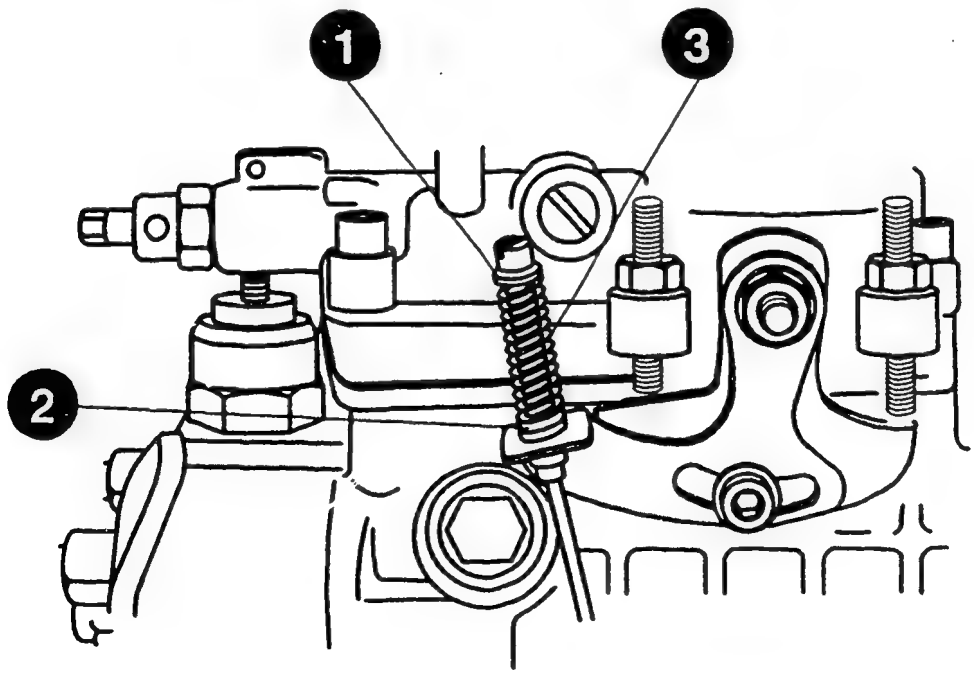
ATTACHING TIMING-DEVICE MEASURING INSTRUMENT

* Pump with timing device KSB coupled with housing-fixed idle spring

1 = Guide spring
2 = Support ring
3 = Pressure spring

If applicable, remove hydraulic damper (attached on side).
Remove guide rod.
Press pressure spring against support ring.
Remove guide sleeve.
Remove pressure spring with support ring.
Unscrew timing device, KSB cover and remove together with guide rod.

Continue: C10/1 Fig.: C09/2



KMK02939

HEATING FUEL-INJECTION PUMP

In the case of pumps with electr. shutoff, the solenoid (pulling electromagnet) must be switched on with the "test voltage" indicated in the test-specification sheet.

No voltage is to be applied in the case of pumps with pushing electromagnet (can be seen from test-specification sheet).
Cylindrical helical coiled spring at control lever.
Pretension governor spring by positioning control lever against rated-speed adjustment screw (adjustment of full-load speed regulation).

Continue: C10/2

HEATING FUEL-INJECTION PUMP

Set fuel inlet pressure of 0.30...0.40 bar at test-bench restriction and drive pump at rated speed until overflow temperature has been reached.

Return temperature with:

Thermometer	40°C...48°C
Electronic indicator	42°C...50°C

* Pay attention to data given in test-specification sheet.

Continue: C11/1

HEATING FUEL-INJECTION PUMP

* Return-temperature measurement with thermometer

Regulate inlet temperature by opening or closing heating restrictor in injection-pump test bench.
There must be pump delivery.
No delivery - screw in full-load screw.
Perm. tank temperature during entire measurement approx. 35°C.

Continue: C11/2

HEATING FUEL-INJECTION PUMP

* Return-temperature measurement with thermometer

If the overflow temperature 40°C...48°C is overshot/undershot during the delivery measurement, pump and calibrating oil must be briefly cooled to below the rated pump speed without delivery measurement or heated at rated speed.

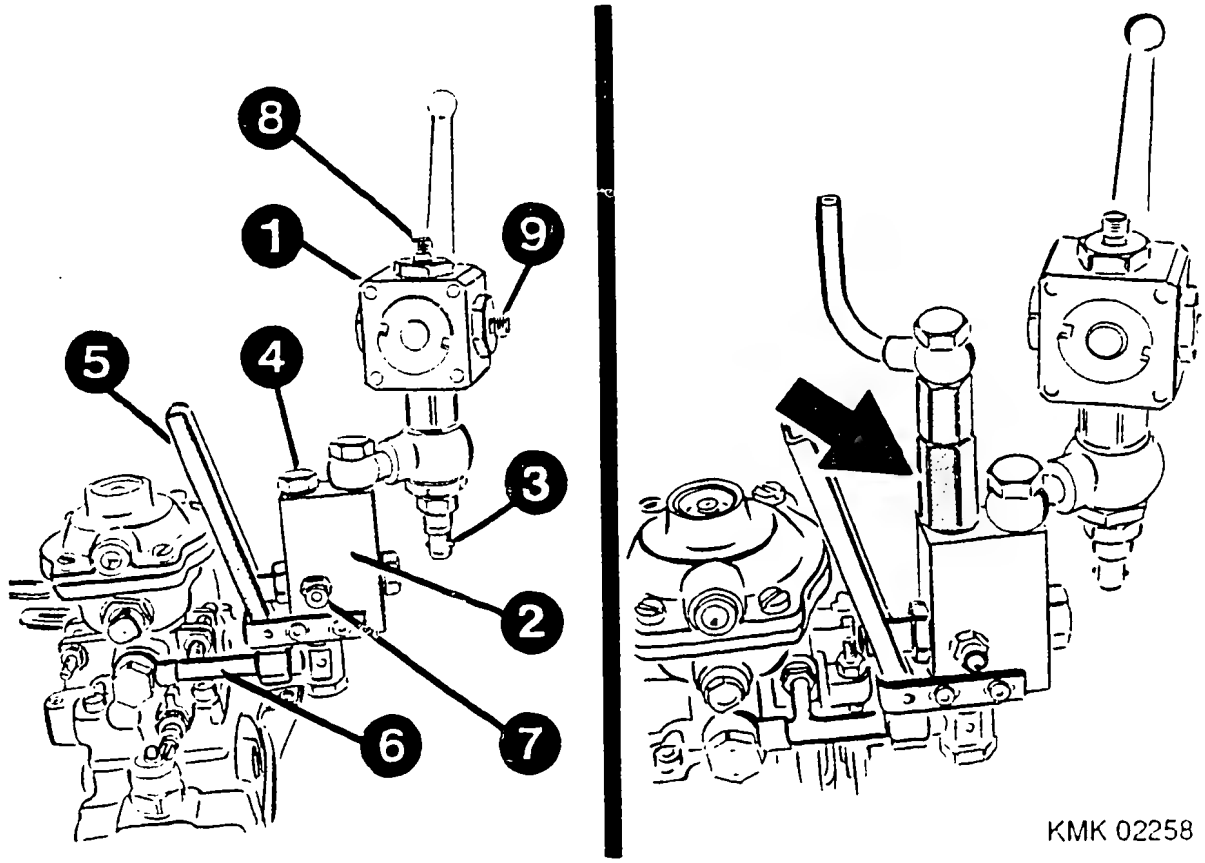
* Pay attention to overflow temperature in test-specification sheet.

Continue: C12/1

HEATING FUEL-INJECTION PUMP
* With electronic indicator
Connection diagram

1 = Multi-way cock
2 = Flushing valve
3 = Connection, temperature sensor
4 = Overflow restriction
When using a threaded connector with restriction, screw adaptor into body of flushing valve (arrow).
5 = Hand lever
6 = Connection piece at calibrating-oil return
7 = Supply pump delivery connection
8 = Return with overflow measurement
9 = Return with no overflow measurement

Continue: C13/1 Fig.: C12/2

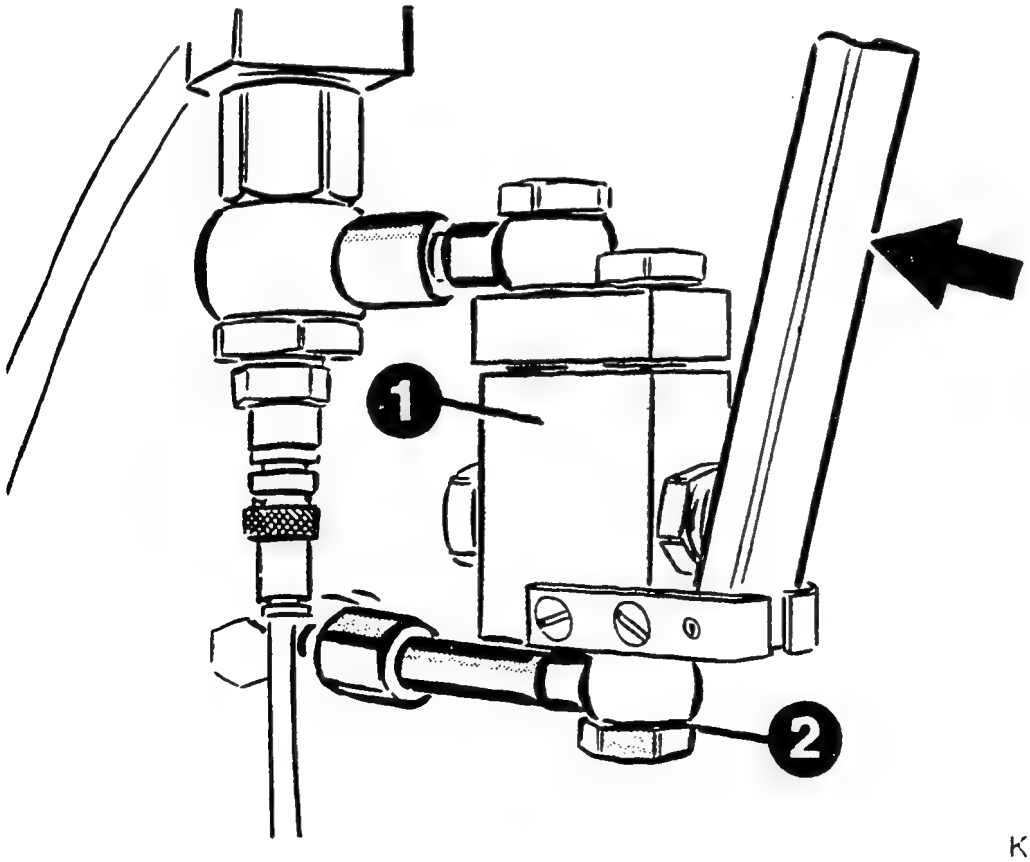


KMK 02258

HEATING FUEL-INJECTION PUMP
 * With electronic indicator
1 = Flushing valve
2 = Overflow restriction

In order to shorten the cooling-down times, use is made of a flushing valve when employing an electronic indicator.
 * Mode of operation:
Pressing the hand lever (arrow) causes the built-in overflow restriction to be bypassed.
As a result, more calibrating oil flows through the pump. This results in quicker cooling.
Flushing valve must not be pressed during measurement.

Continue: C14/1 Fig.: C13/2



KMK 02259

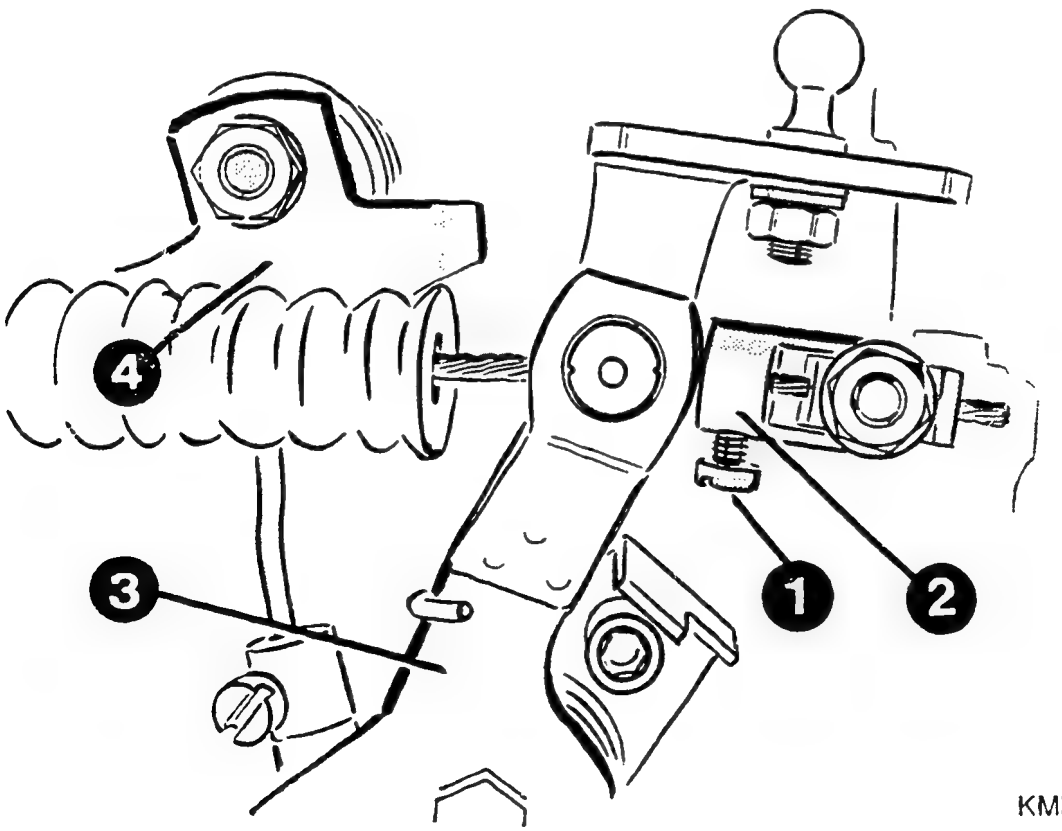
INITIAL PUMP INSPECTION
Prerequisite:
 * Deactivate KSB function if
   appropriate

1 = Clamping screw
2 = Adaptor
3 = Control lever
4 = Regulating lever

Deactivate function of control device,
cam roller ring, KSB:

Loosen clamping screw.
Pull adaptor with control lever in
direction of distributor head.

Continue: C15/1 Fig.: C14/2

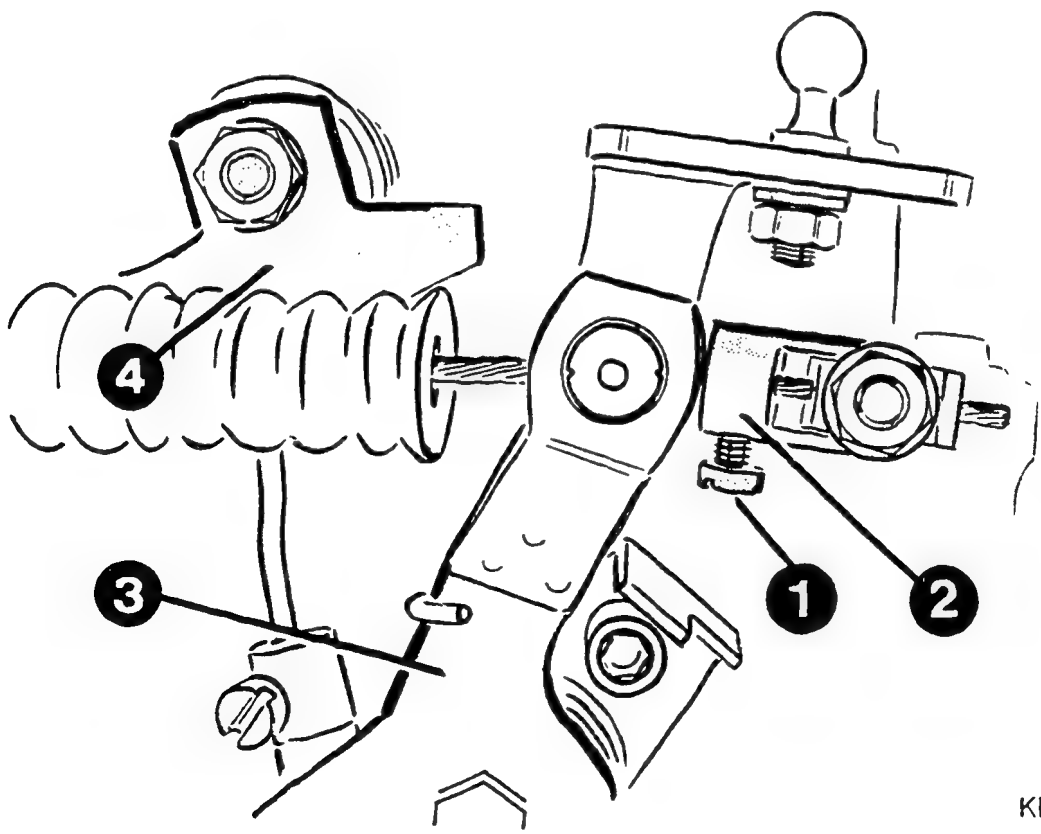


KMK 02260

INITIAL PUMP INSPECTION
Prerequisite:
* Deactivate KSB function if appropriate

1 = Clamping screw
2 = Adaptor
3 = Control lever
4 = Regulating lever
Turn adaptor through 90° and push in direction of drive shaft again until control lever makes contact with stop bracket.
The control device is deactivated in this position.
Disengage linkage of regulating lever from control lever.

Continue: C16/1 Fig.: C15/2

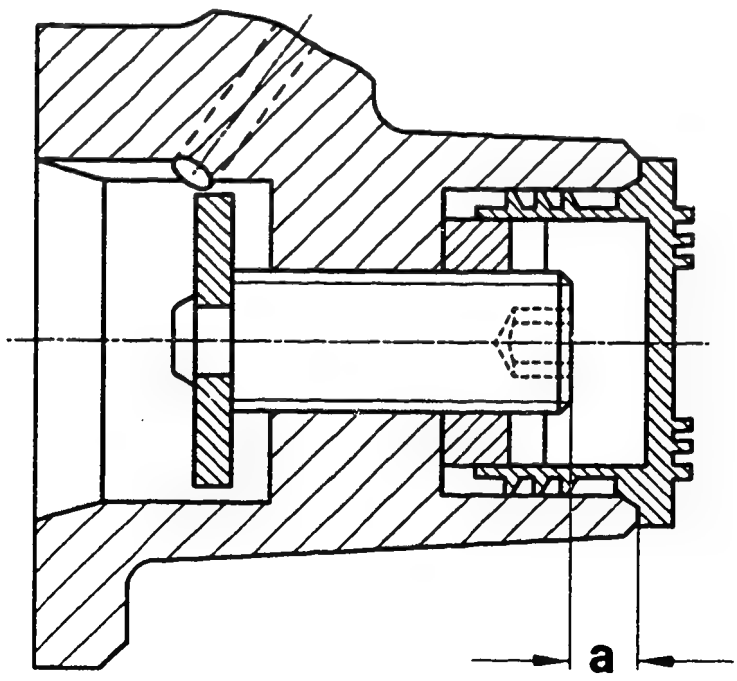


KMK 02260

INITIAL PUMP INSPECTION
Prerequisite:
* Checking of timing-device pretensioning

If timing device is provided with adjusting screw accessible from outside, check basic setting of timing-device spring pretension (dimension "a").
Dimension "a" = 3.3 +/- 0.1 mm
Note:
Spring pretension may possibly have been adjusted with this version on engine (max. 1.0 mm).
Total screw-in depth of adjusting screw may be 4.3 +/- 0.1 mm.
Establish basic setting "a"= 3.3 +/- 0.1 mm.

Continue: C17/1 Fig.: C16/2



KMK02261

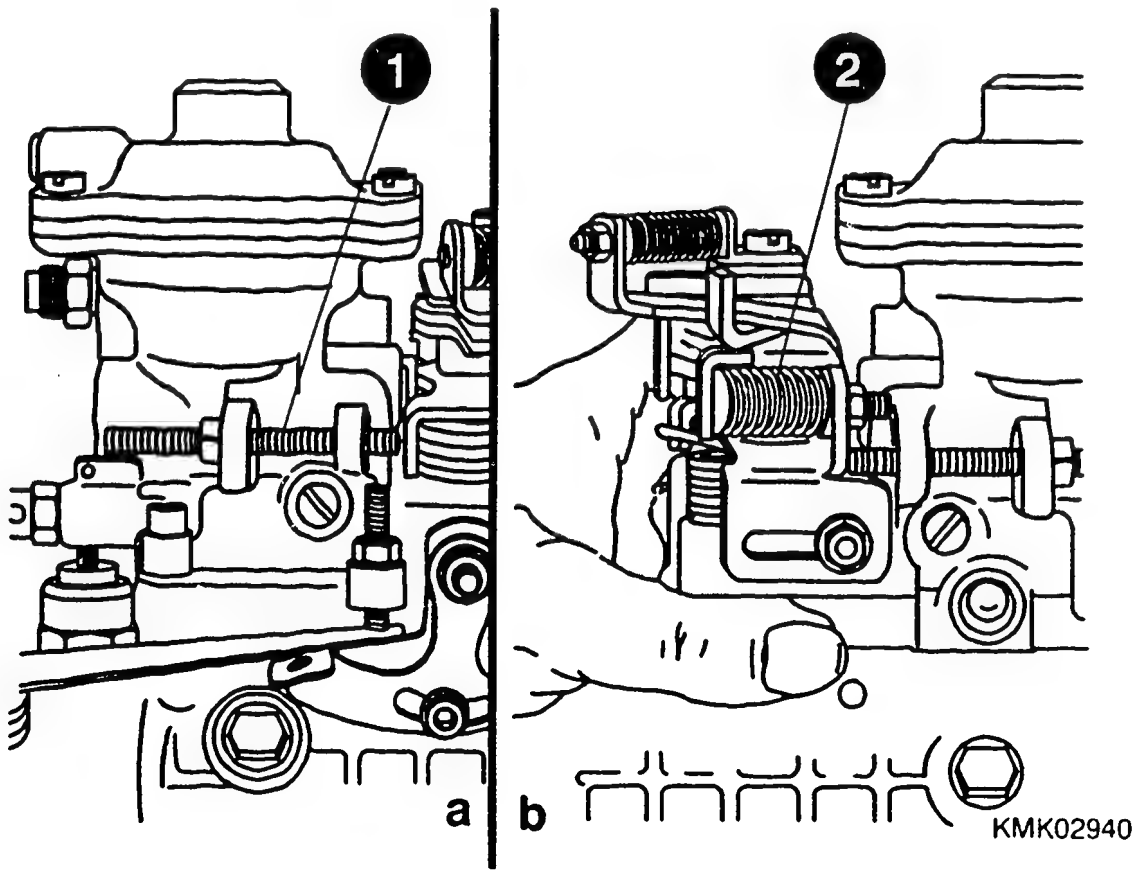
INCOMING INSPECTION OF PUMP WITH MLD

* Check residual quantity

1 = Residual-quantity stop screw
2 = Pressure spring (damping spring)

Position intermediate lever against residual-quantity stop screw.
Do not overcompress pressure spring (damping spring) in this lever position.
Make up 2 mm between LFG stop lever and idle stop screw.
Approach speed and measure delivery. adjust by way of residual-quantity adjusting screw.

Continue: C18/1 Fig.: C17/2



INCOMING INSPECTION OF PUMP WITH MLD
 * Check idle setting

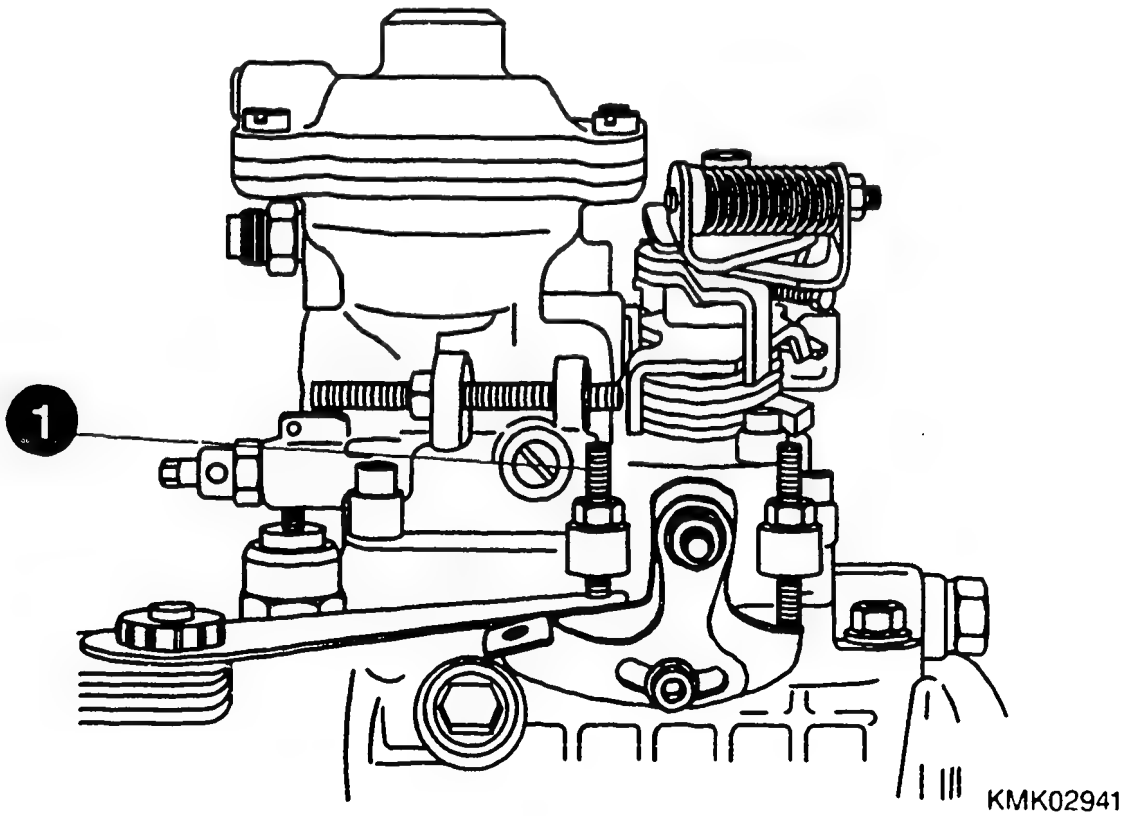
Arrow = Idle adjusting screw

Position LFG stop lever with spacer
2 mm against idle stop screw.

Position speed-control lever against
residual-quantity stop screw.

Approach speed and measure delivery.
Adjust delivery by way of adjusting
screw.

Continue: C19/1 Fig.: C18/2



INITIAL PUMP INSPECTION

Initial inspection on the test bench is performed in the same sequence as the test sequence.

As regards the initial inspection, the VALUES IN BRACKETS on the test-specification sheet apply (observe quantity scatter).
Enter values determined in test record.
If the values have to be corrected, the test specifications NOT IN BRACKETS apply.

Continue: C19/2

NOTE:
The supply pump pressure is of secondary importance as regards functional assessment.
Delivery and timing-device travel are the crucial variables and must be within the prescribed tolerance.
Check values (values in parentheses) for the supply pump pressure are invalid.
As regards warranty tests, all check measurements envisaged in the test-specification sheet are to be performed with the exception of the check value for the supply pump pressure.

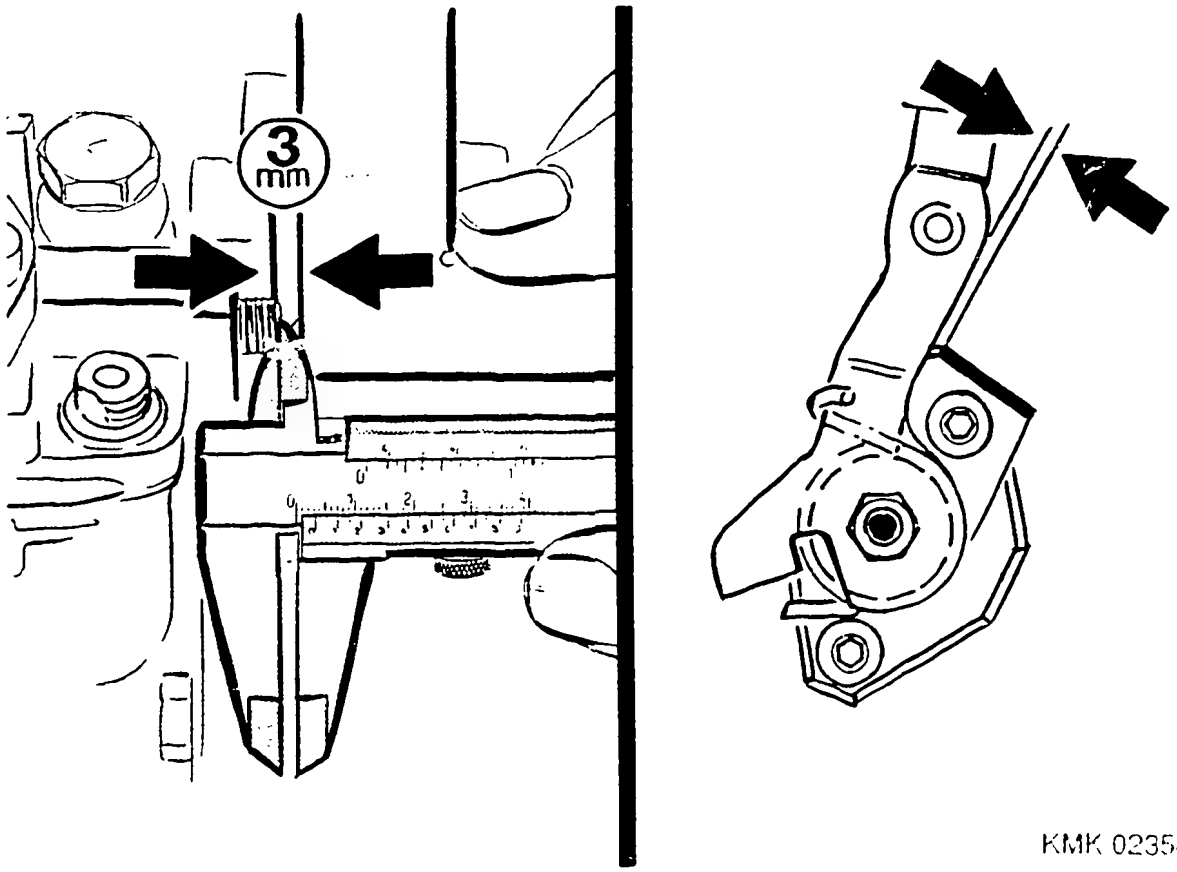
Continue: C20/1

PREPARATION OF FUEL-INJECTION PUMP FOR ADJUSTMENT

* Prerequisite:
- Governor shaft statically preset on pumps with and without load-dependent start of delivery (LFB).
  Without LFB approx. 3.0 mm
  With LFB approx. 1.5 mm

- Stop bracket of temperature-dependent cold-start acceleration device (KSB) set to spacing dimension.
  Spacing dimension 0.5 + 0.2 prior to start of stroke

Continue: C21/1 Fig.: C20/2



KMK 02354

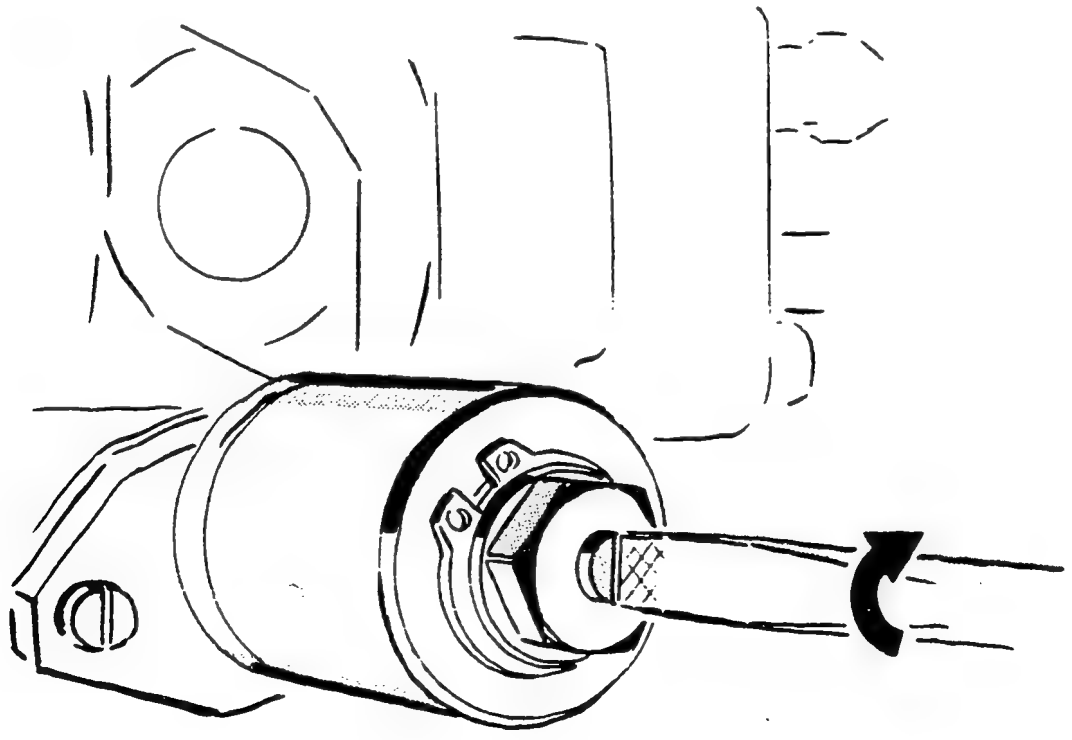
ADJUSTING FUEL-INJECTION PUMP

* ADJUSTING SUPPLY PUMP PRESSURE AND TIMING-DEVICE TRAVEL

NOTE: If HBA fitted, pay attention to note on Coordinate C22/1.

Position control lever against rated-speed adjusting screw.
If necessary, vent timing-device measuring instrument at end face.
Set boost pressure at restrictor as per test-specification sheet.
The setting for the supply pump pressure and timing-device travel must be obtained at the speed stated in the test-specification sheet.

Continue: C23/1 Fig.: C21/2



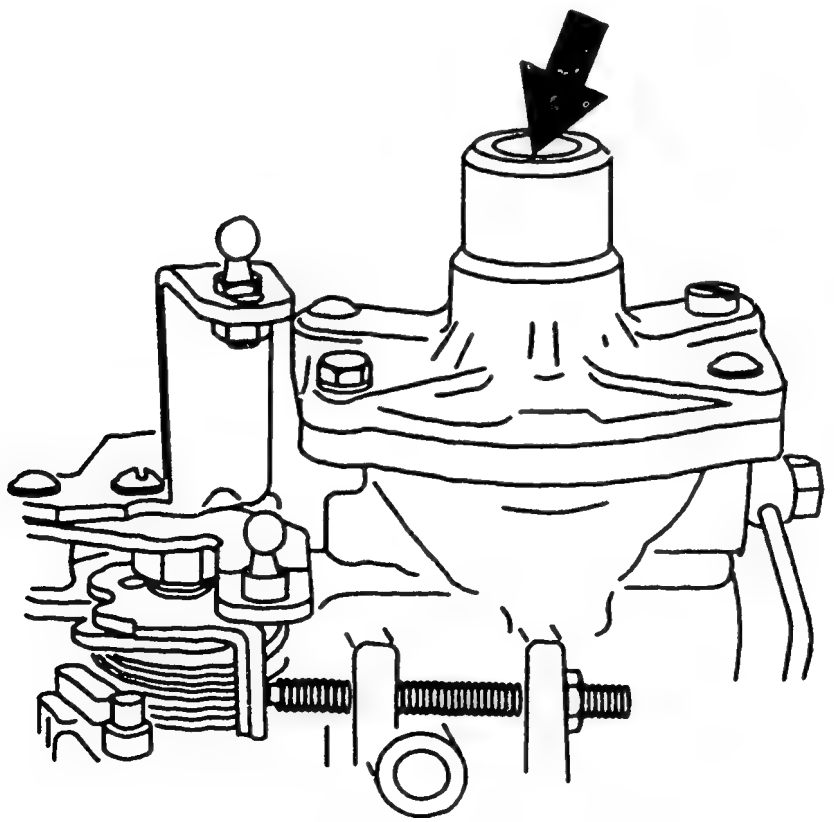
KMK 02262

ADJUSTING SUPPLY PUMP PRESSURE AND TIMING-DEVICE TRAVEL
* Pump with HBA

Arrow = HBA adjusting screw

Turn HBA adjusting screw in counter-clockwise direction until mechanical stop is felt.
(Max. HBA spring pretension)

Continue: C23/1 Fig.: C22/2



KMK02954

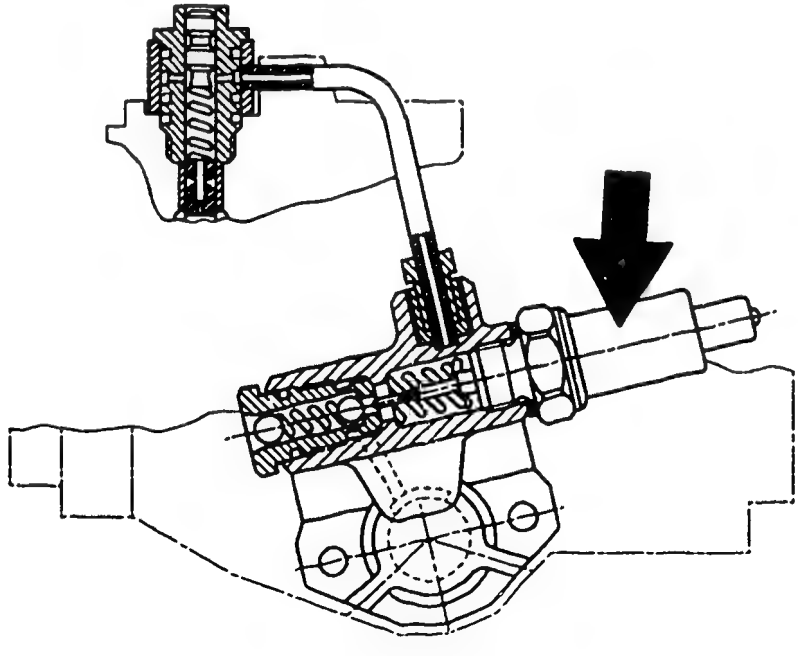
ADJUSTING SUPPLY PUMP PRESSURE AND TIMING-DEVICE TRAVEL

Arrow = Solenoid valve

If a hydraulic KSB or a frequency valve is fitted, apply voltage to frequency valve or solenoid valve (expansion element).

* Refer to test-specification sheet for voltage value.

Continue: C24/1 Fig.: C23/2



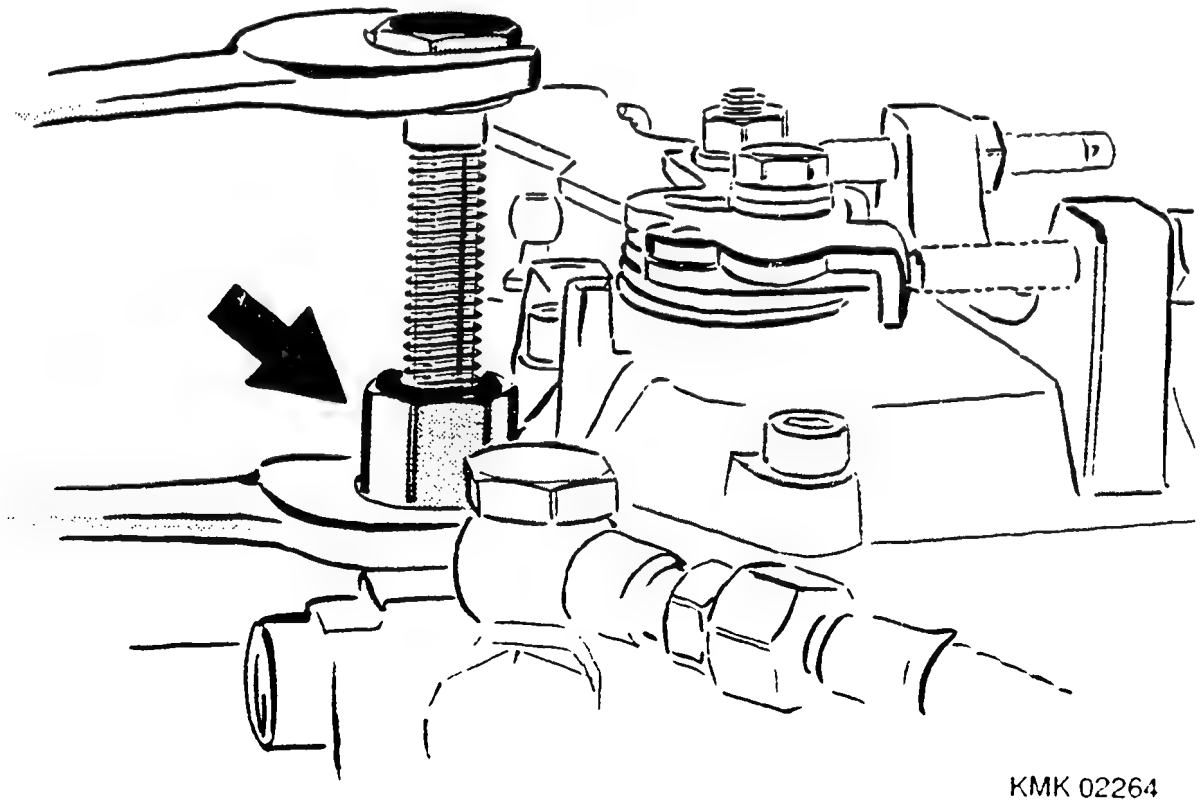
KMK02263

ADJUSTING SUPPLY PUMP PRESSURE

NOTE:
Before adjusting supply pump pressure, preset full-load delivery to approx. 3 – 4 ccm.
If presetting is not made, supply pump pressure and timing-device travel may be subject to change after full-load adjustment.

Slip pressing-in tool KDEP 1092 onto pressure regulator and turn through 90°.
Press plug into pressure regulator by screwing it in.
Counterhold pressing-in tool (arrow).

Continue: C25/1 Fig.: C24/2



KMK 02264

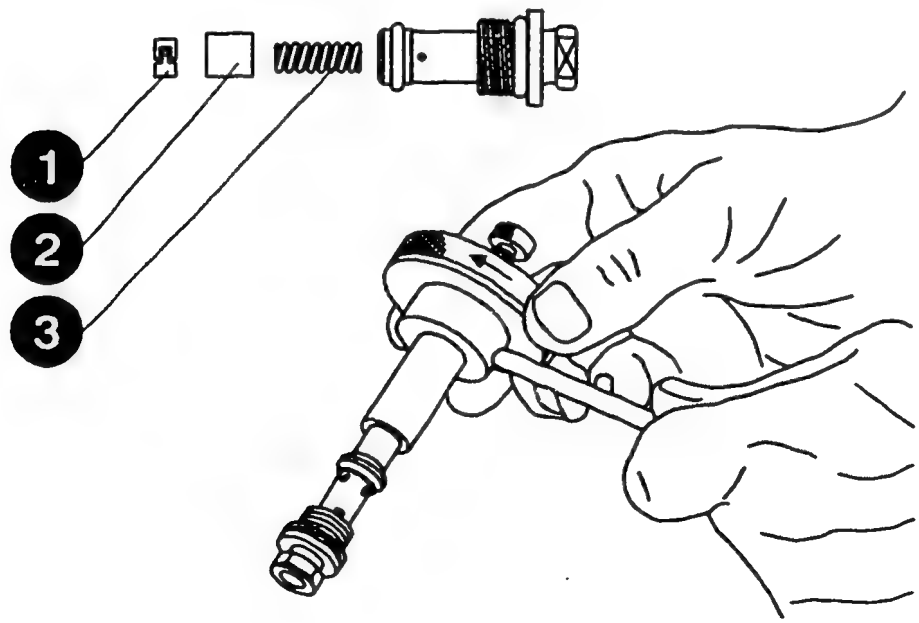
ADJUSTING SUPPLY PUMP PRESSURE

1 = Clamping sleeve
2 = Piston
3 = Pressure spring

This increases the supply pump pressure and "advances" the timing device.
If the supply pump pressure is too high, remove pressure regulator with socket wrench KDEP 1086.

Remove clamping sleeve with puller KDEP 1027.
Remove piston and pressure spring.

Continue: C26/1 Fig.: C25/2



KMK02265

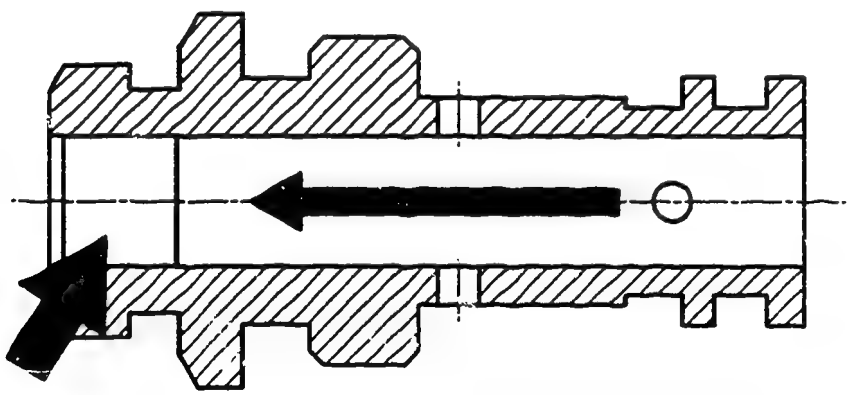
ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Plug

Press out plug.

Then re-install pressure spring and piston in pressure regulator.

Continue: C27/1 Fig.: C26/2



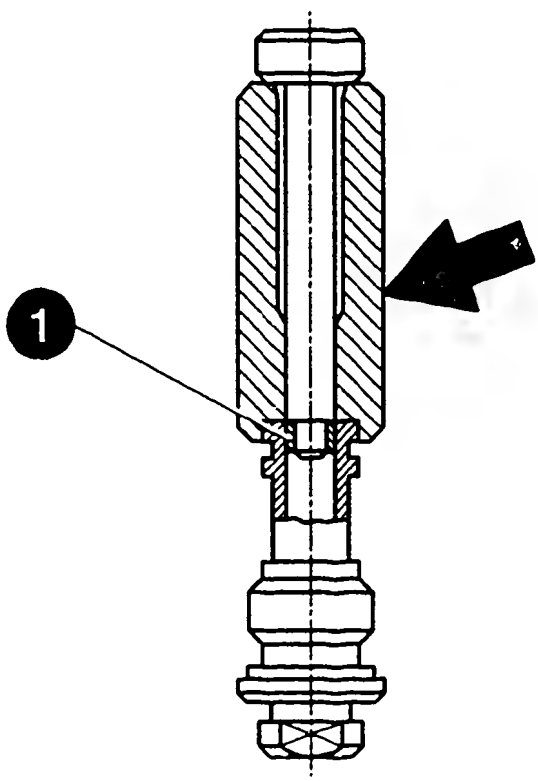
KMK02266

ADJUSTING SUPPLY PUMP PRESSURE

1 = Clamping sleeve

Press in the new clamping sleeve with pressing-in tool (arrow) KDEP 1093 such that it is flat.
Install pressure regulator and tighten to tightening torque 7...10 Nm.
Repeat adjustment of supply pump pressure.

Continue: C28/1 Fig.: C27/2



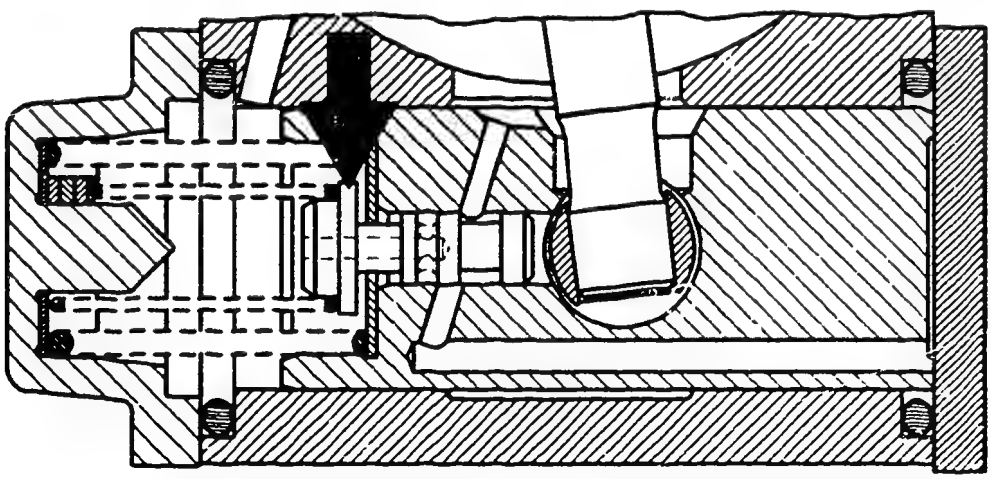
KMK02267

ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Control plunger

Eliminate cause as per repair instructions if supply pump pressure is not obtained.
NOTE:
If timing-device version with follow-up plunger (NLK) is fitted, check control plunger for freedom of movement before disassembling pump.
* Pump W I T H N O follow-up plunger
  continue on Coordinate D03/1

Continue: D01/1 Fig.: C28/2



KMK 02943

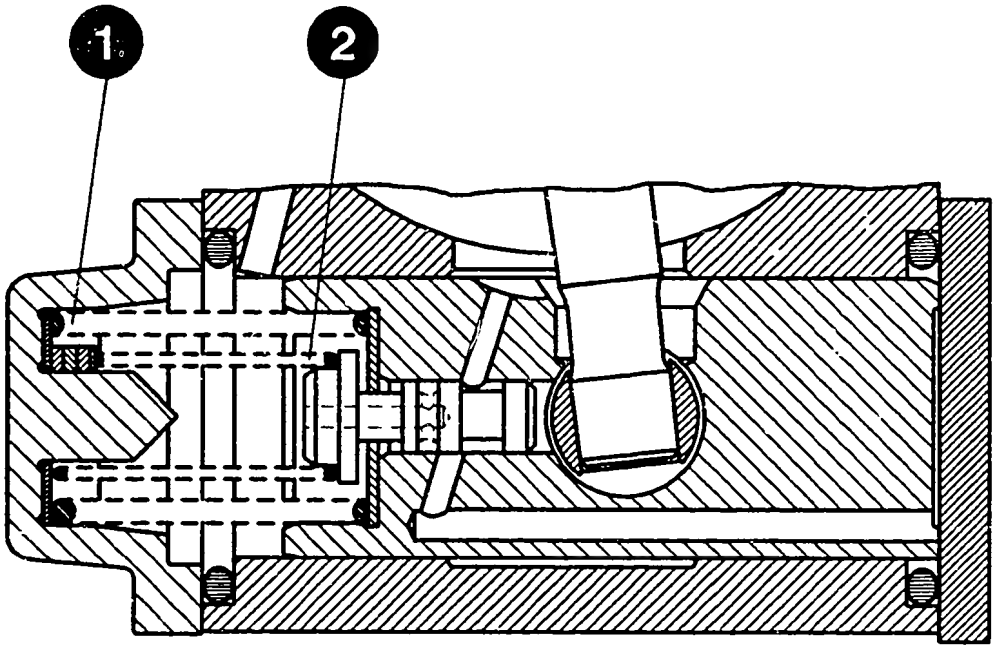
ADJUSTING SUPPLY PUMP PRESSURE

1 = Timing-device spring
2 = Return spring (control plunger)

To do so, remove timing-device cover on spring side.
Pay attention to spaces in timing-device cover and timing-device piston.
Note: The timing-device cover may feature a maximum of 2 shims for spring pretension, control plunger.

Remove timing-device spring and return spring from control plunger.

Continue: D02/1 Fig.: D01/2



KMK 02944

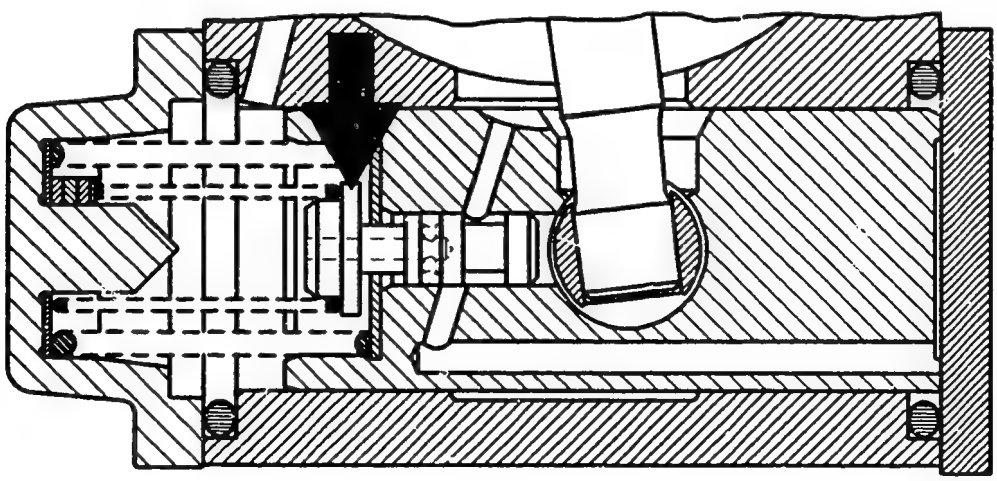
ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Control plunger

Remove control plunger and check for freedom of movement.
Assemble parts and repeat adjustment of supply pump pressure.

Eliminate cause in line with repair instructions if supply pump pressure is not obtained.

Continue: D03/1 Fig.: D02/2



KMK 02943

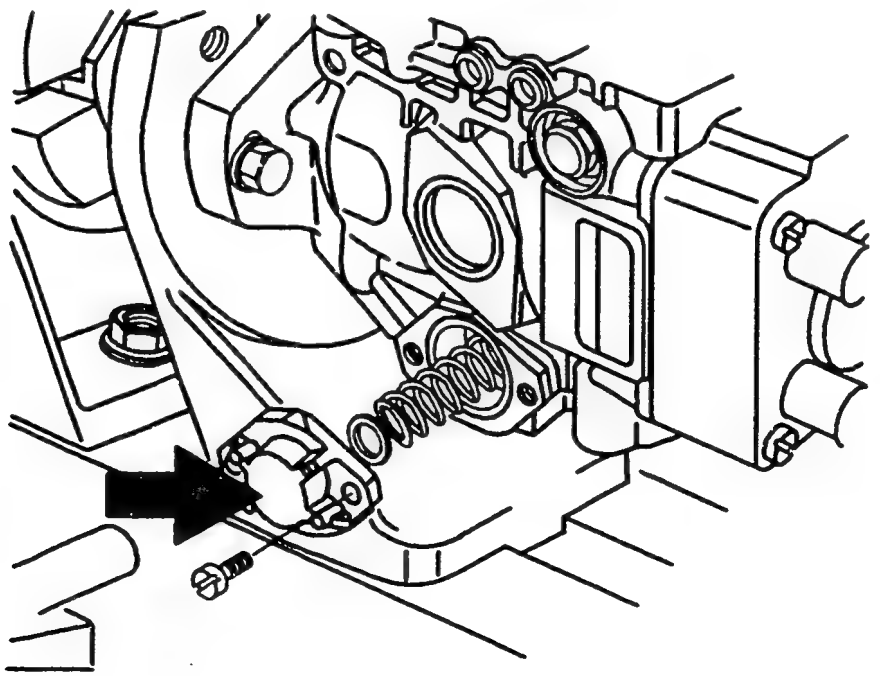
ADJUSTING TIMING-DEVICE TRAVEL

Arrow = Timing-device cover

If the prescribed timing-device travel is not attained with utilization of the tolerance for the supply pump pressure, check timing-device shims.

Timing-device cover (spring end).

Continue: D04/1 Fig.: D03/2



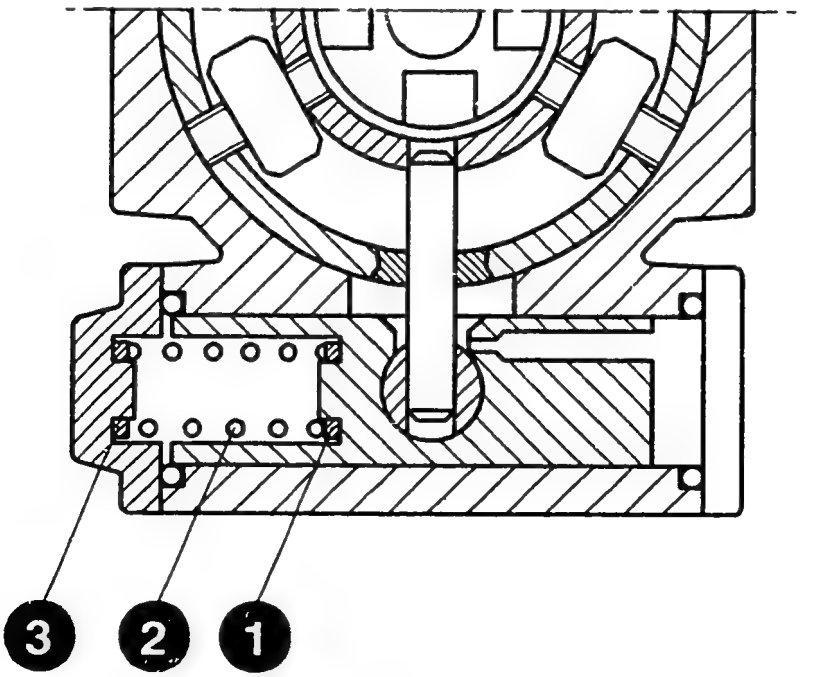
KMK02268

ADJUSTING TIMING-DEVICE TRAVEL

1 = Shim
2 = Pressure spring
3 = Timing-device shims

Measure thickness of shims made up of items 1 and 3.
Likewise make allowance for shim 1 and compare to dimension "SVS" as per test-specification sheet.
Insert approx. 0.6 mm thick shim in timing-device piston.
Fit pressure spring.

Continue: D05/1 Fig.: D04/2



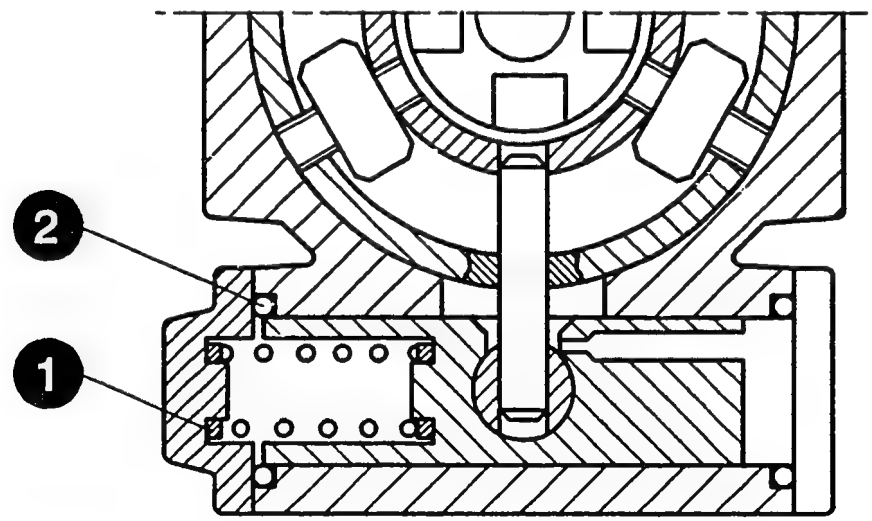
KMK02269

ADJUSTING TIMING-DEVICE TRAVEL

1 = Timing-device shims
2 = Sealing ring

Insert sealing ring and fit cover with remaining shims (which produce dimension "SVS").
NOTE:
There must be at least 1 shim on either side of pressure spring.
Repeat measurement of timing-device travel.
If timing-device travel is not attained despite correction of shims - check freedom of movement of timing-device piston as per repair instructions.

Continue: D06/1 Fig.: D05/2



KMK02358

ADJUSTING FULL-LOAD DELIVERY

Select further adjustment in line with following add-on modules:

	Coordinate
* Boost-pressure-dependent full load stop (LDA) Version: LDA housing	D07/1
* Version: Stepped LDA	D12/1
* Version: External LDA	D15/1
* Hydraulic torque control (HBA)	D19/1

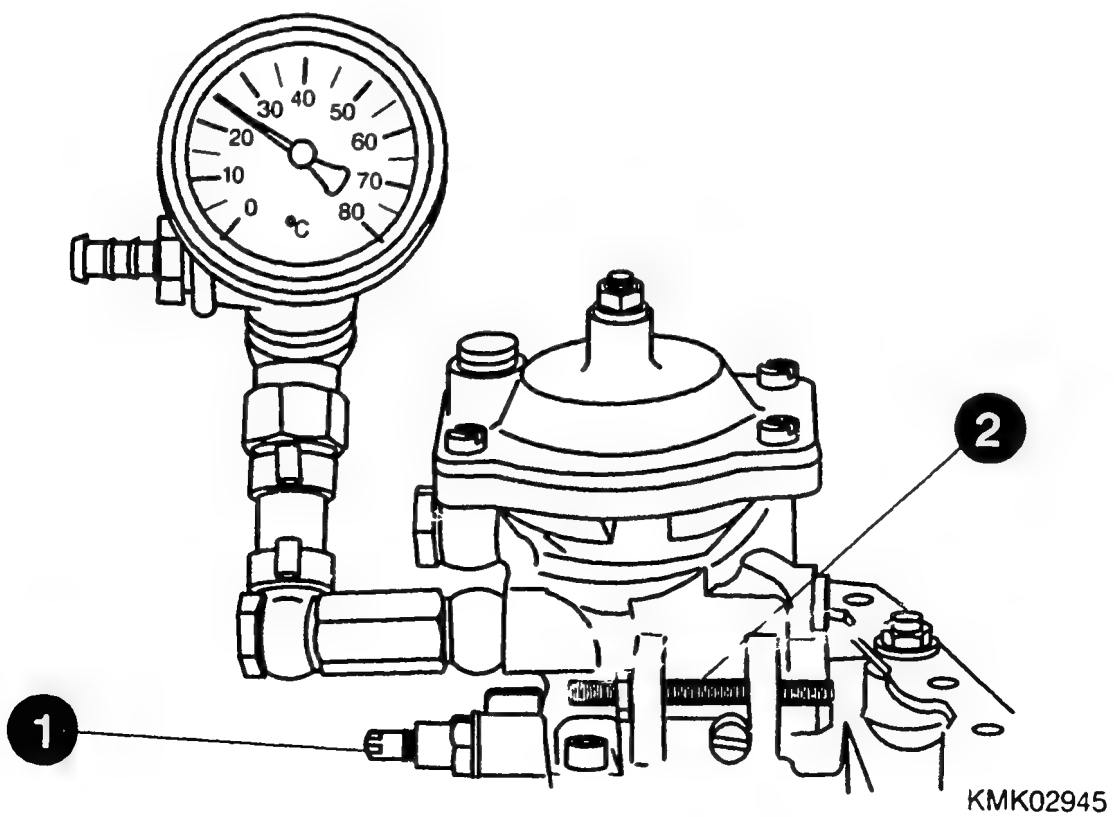
Continue: D07/1

ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE
* Pump with LDA housing

1 = Full-load adjusting screw
2 = Rated-speed adjusting screw

Pretension governor spring by positioning control lever against rated adjusting screw.
Set stated pump speed.
Adjust boost pressure at restrictor in line with test-specification sheet.
Set full-load delivery by turning full-load adjusting screw.
Clockwise = greater delivery

Continue: D08/1 Fig.: D07/2

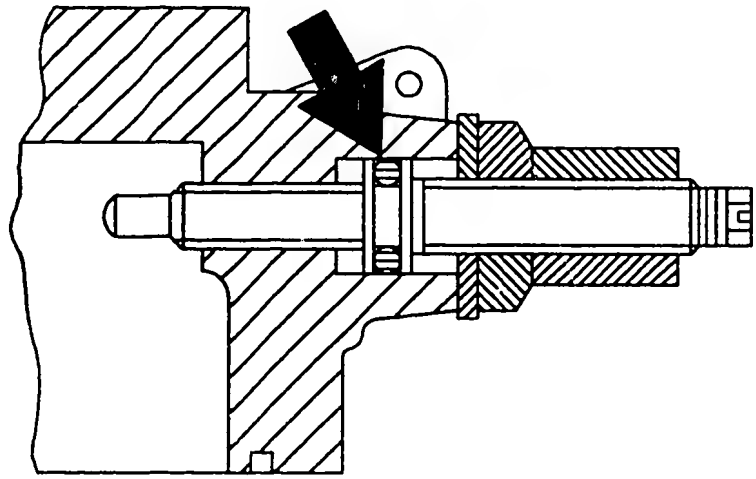


ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE
* Pump with LDA housing

Arrow = O-Ring

O-Ring of full-load adjusting screw must not emerge from hole.
If necessary, use shorter adjusting screw.

Continue: D09/1 Fig.: D08/2



KMK02946

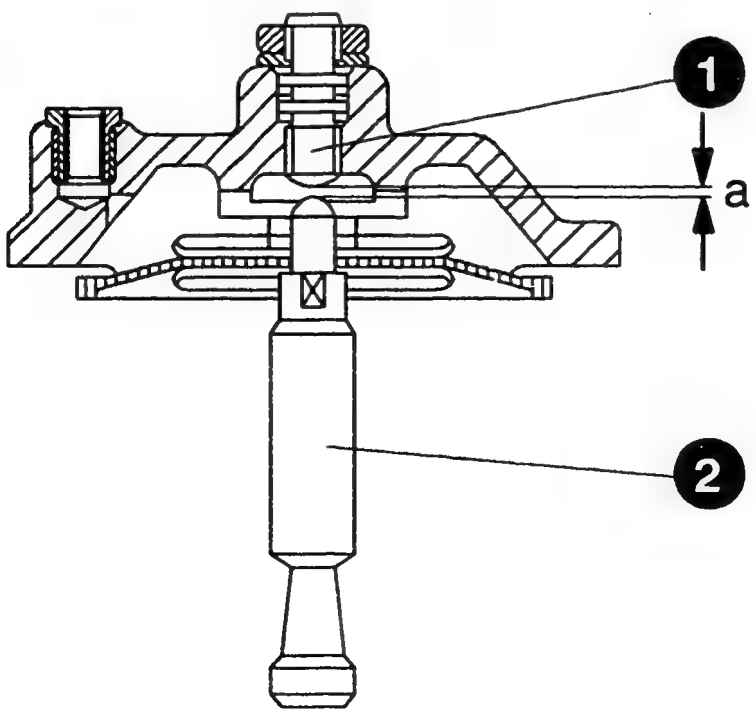
ADJUSTING FULL-LOAD DELIVERY WITHOUT BOOST PRESSURE

* Pump with LDA housing

1 = Adjusting screw for normal delivery quantity
2 = LDA adjusting pin

Remove boost pressure connection.
Before setting normal delivery quantity, set distance between adjusting screw for normal delivery quantity and end face of LDA adjusting pin.
Spacing "a" = 0.5 mm
Procedure:
Screw in adjusting screw for normal delivery quantity until it makes contact with LDA adjusting pin.
Turn back adjusting screw for normal delivery quantity half a turn.

Continue: D10/1 Fig.: D09/2



KMK02947

ADJUSTING FULL-LOAD DELIVERY WITHOUT BOOST PRESSURE

* Pump with LDA housing

Arrow = Adjusting screw for normal delivery quantity

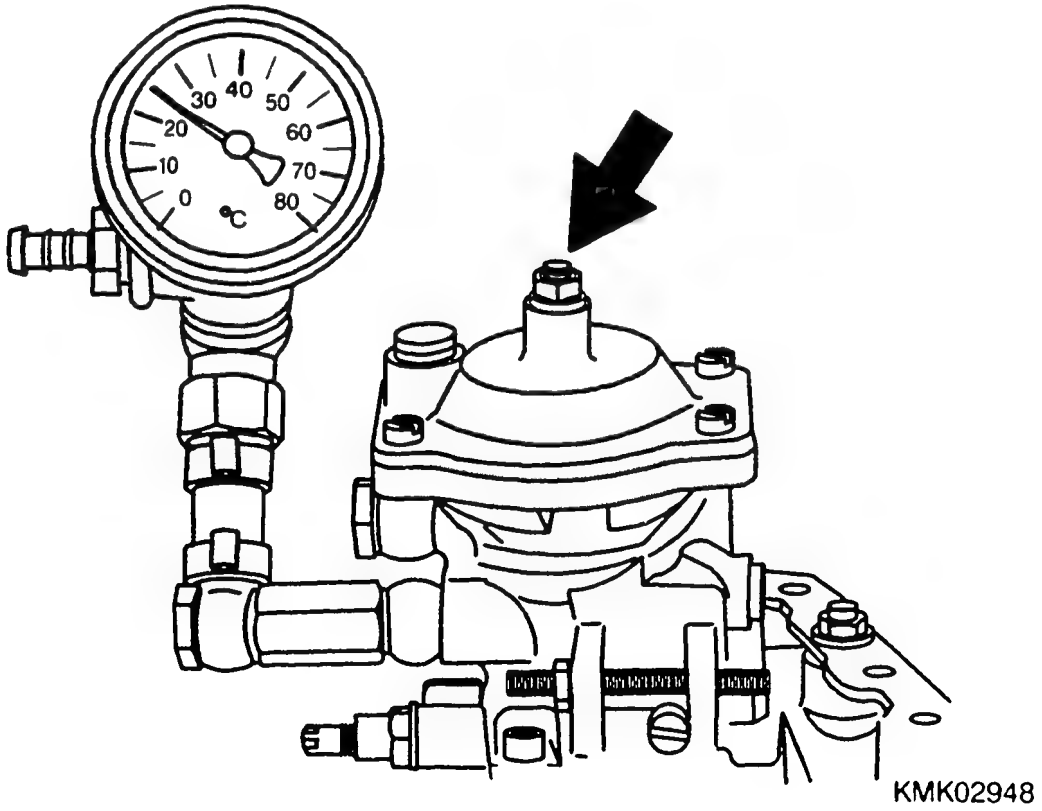
Measure full-load delivery at stated speed.

* Full-load delivery too high:

Turn back threaded pin (adjusting screw for normal delivery quantity) until full-load delivery is at upper tolerance limit.

Remove LDA cover if full-load delivery cannot be adjusted.

Continue: D11/1 Fig.: D10/2



ADJUSTING FULL-LOAD DELIVERY WITHOUT BOOST PRESSURE

* Pump with LDA housing

1 = Diaphragm

Mark diaphragm position.
Turn diaphragm slightly and re-install cover.
Measure full-load delivery.
Repeat procedure until delivery is attained.

Always check full-load delivery with boost pressure following correction.

Continue: D21/1

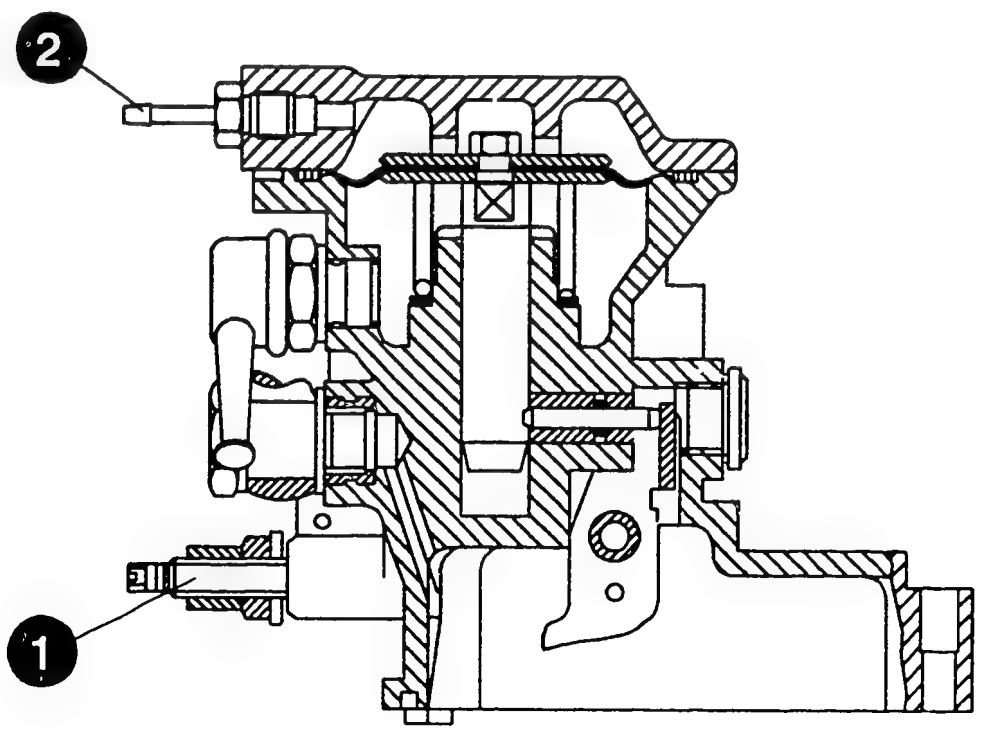
ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE

* Pump with stepped LDA

1 = Full-load adjusting screw
2 = Boost pressure connection

Pretension governor spring by positioning control lever against rated-speed adjusting screw.
Set indicated pump speed.
Set boost pressure at restrictor in line with test-specification sheet.
Adjust full-load delivery by turning full-load adjusting screw, delivery.
Clockwise = more

Continue: D13/1 Fig.: D12/2



KMK02949

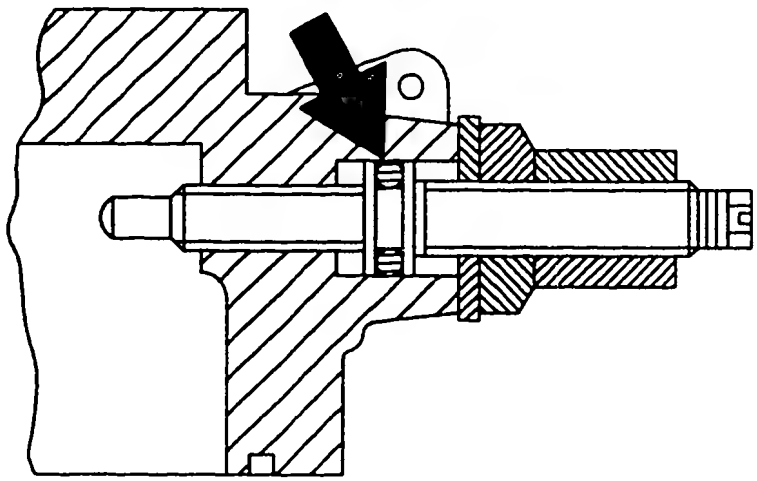
ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE

* Pump with stepped LDA

Arrow = O-ring

O-ring of full-load adjusting screw must not emerge from hole.
If necessary, use shorter adjusting screw.

Continue: D14/1 Fig.: D13/2



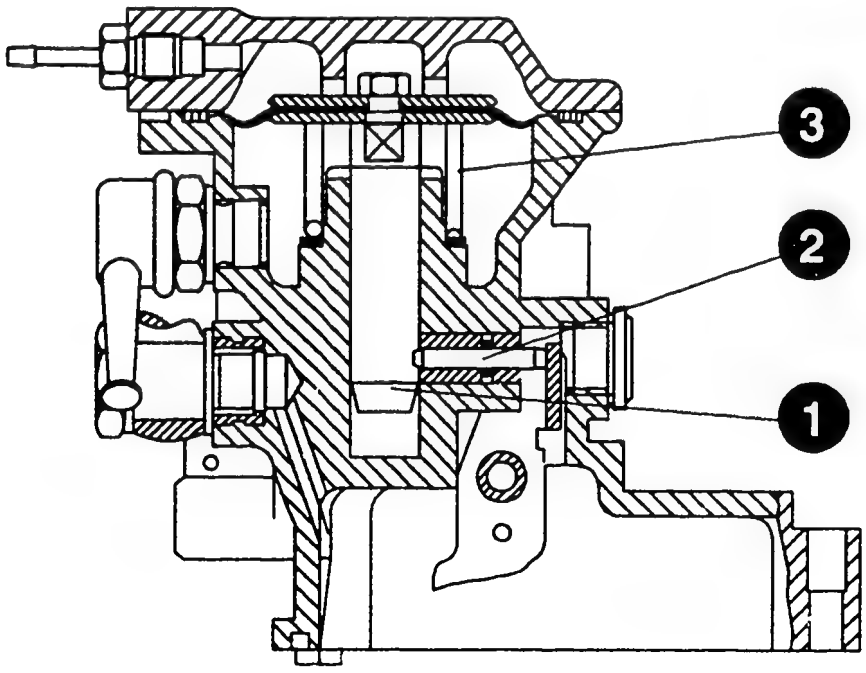
KMK02946

ADJUSTING FULL-LOAD DELIVERY
WITHOUT BOOST PRESSURE
* Pump with stepped LDA

1 = Surface-type LDA adjusting pin
2 = Guide pin
3 = LDA spring

Note:
The normal delivery quantity can be adjusted with this LDA version.
Guide pin, LDA spring and LDA adjusting pin determine the above.
Take care not to lose parts.
Remove boost pressure connection.
Measure full-load delivery at stated speed.

Continue: D21/1 Fig.: D14/2



KMK02950

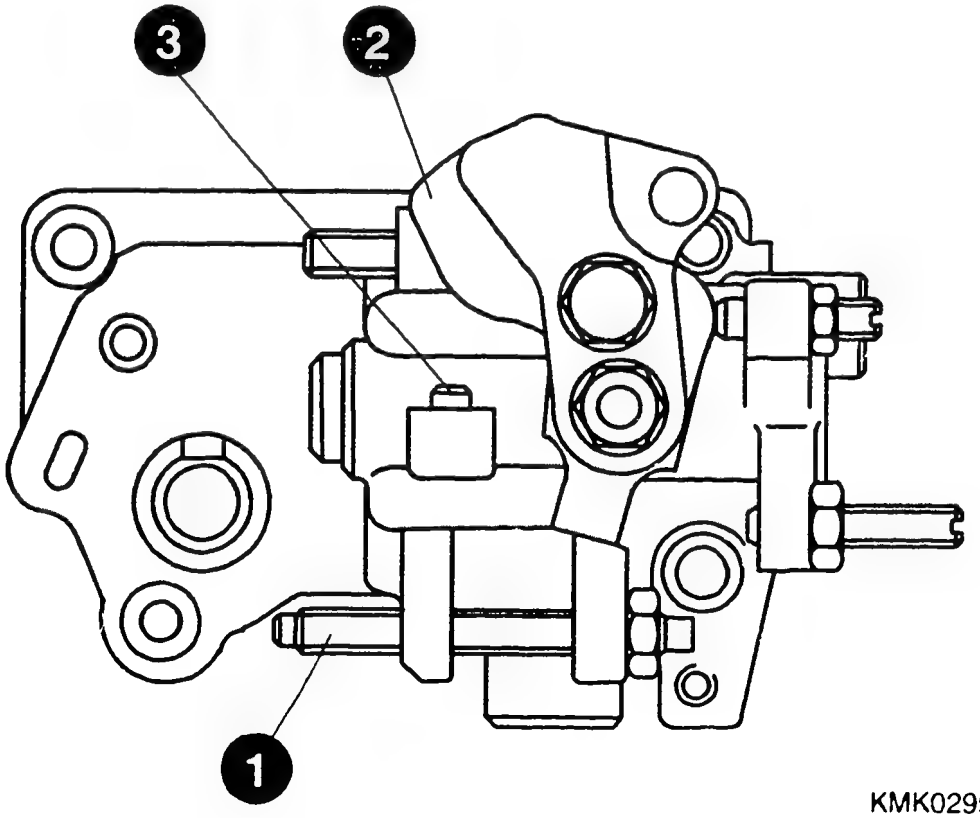
ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE

* Pump with external LDA

1 = Rated-speed adjusting screw
2 = LDA control lever
3 = Full-load boost pressure stop

Pretension governor spring by positioning speed-control lever against rated-speed adjusting screw. Position LDA control lever against full-load boost pressure stop.

Continue: D16/1 Fig.: D15/2



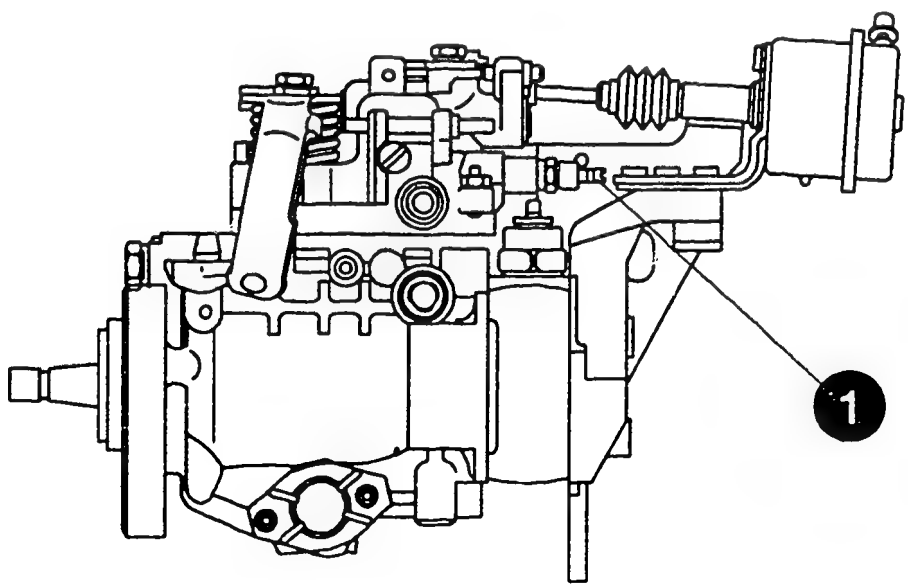
KMK02951

ADJUSTING FULL-LOAD DELIVERY WITH BOOST PRESSURE
* Pump with external LDA

Arrow = Full-load adjusting screw

Set prescribed full-load delivery by turning full-load adjusting screw at stated speed.

Continue: D17/1 Fig.: D16/2



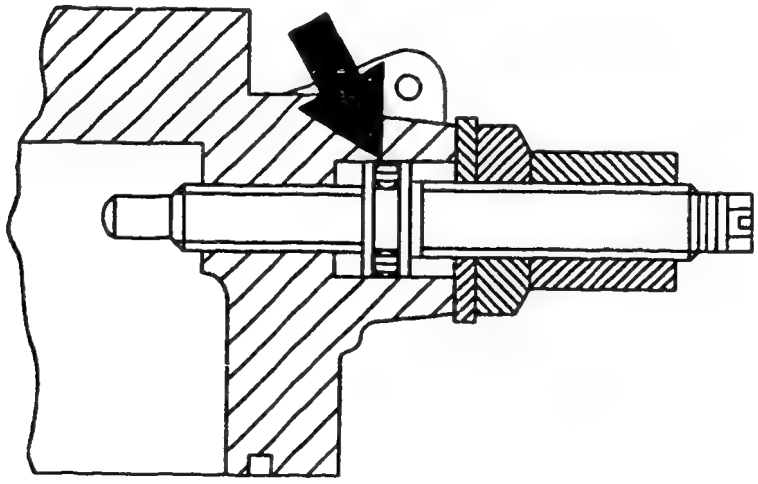
KMK02952

ADJUSTING FULL-LOAD DELIVERY WIT''
BOOST PRESSURE
 * Pump with external LDA

Arrow = O-Ring

O-Ring must not emerge from hole in
housing following full-load adjustment.
Fit shorter full-load adjusting screw.

Continue: D18/1 Fig.: D17/2



KMK02946

ADJUSTING FULL-LOAD DELIVERY WITHOUT BOOST PRESSURE

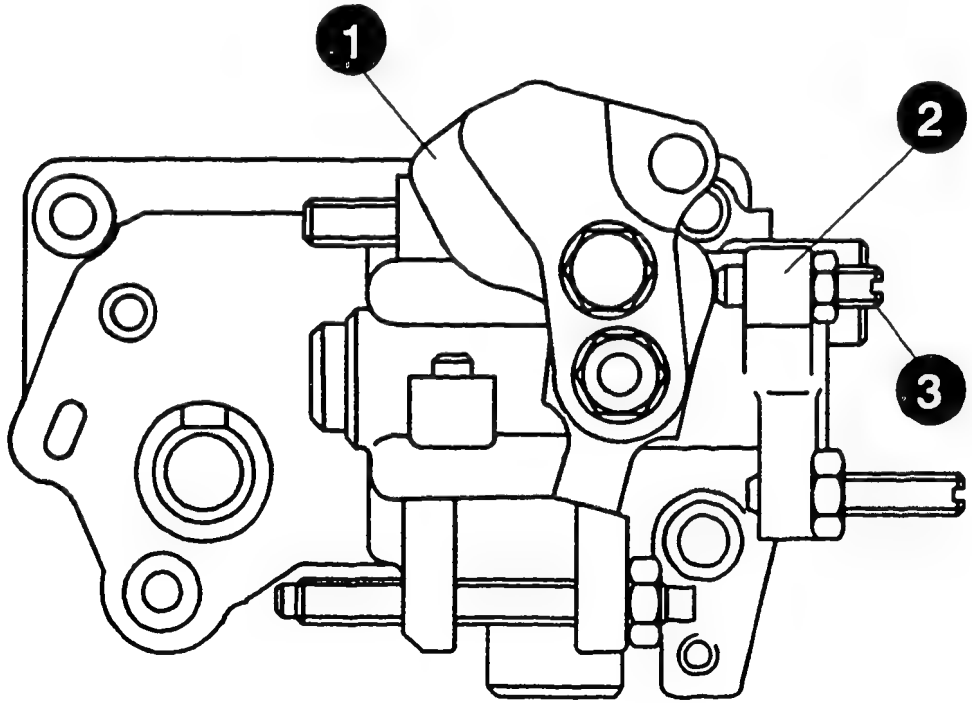
* Pump with external LDA

1 = LDA control lever
2 = Stop for normal delivery quantity
3 = Adjusting screw

Position LDA control lever against stop for normal delivery quantity. Set speed for adjustment point of full-load normal delivery quantity and correct full-load delivery at adjusting screw.

Clockwise = greater delivery

Continue: D21/1 Fig.: D18/2



KMK02953

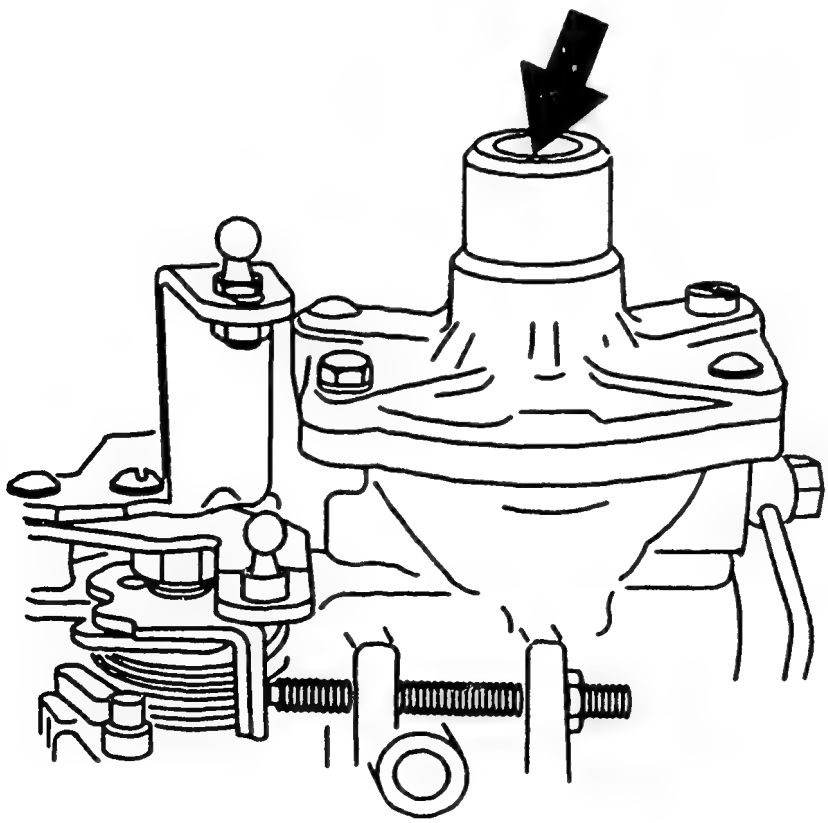
ADJUSTING FULL-LOAD DELIVERY
* Pump with hydraulic torque control (HBA)

Turn HBA adjusting screw (arrow) in counter-clockwise direction until mechanical stop is felt.
(Max. HBA spring pretension).

Position speed-control lever against rated-speed adjusting screw.

Approach lower full-load speeds "F" and preset full-load delivery at full-load adjusting screw.
If applicable, remove anti-tamper cap at full-load screw.

Continue: D20/1 Fig.: D19/2



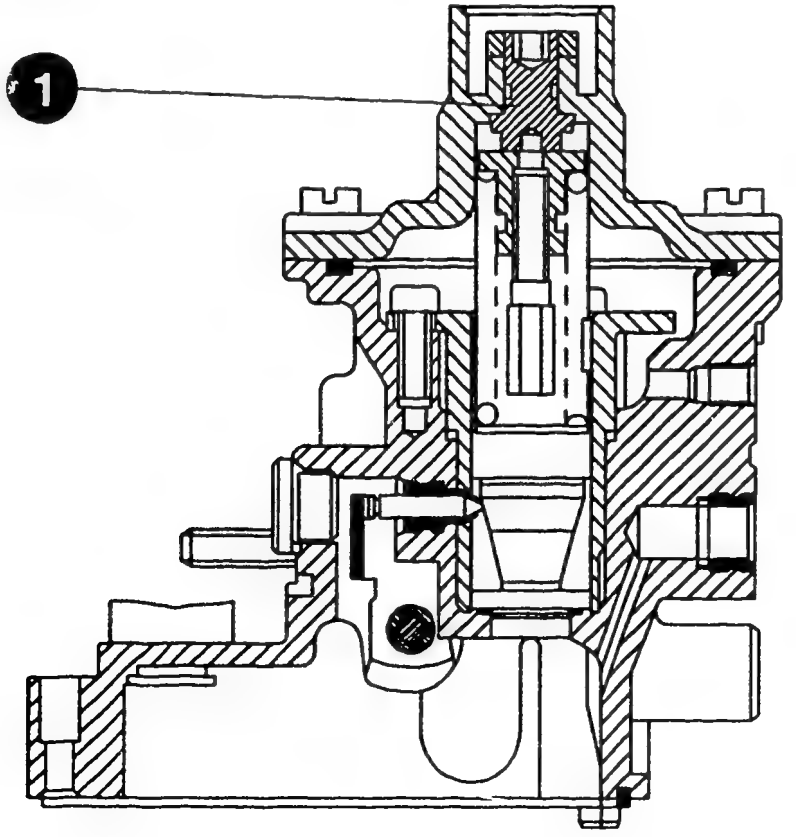
KMK02954

ADJUSTING FULL-LOAD DELIVERY
* Pump with hydraulic torque control (HBA)

1 = HBA adjusting screw

Approach full-load point "E" and measure delivery.
Set delivery by way of HBA adjusting screw.

Continue: D21/1 Fig.: D20/2



KMK02955

ADJUSTING LOW-IDLE SPEED REGULATION

Select adjustment sequence in line with the following features:

If new control lever was fitted, adjust control-lever position

2-piece control lever
refer to Coordinate L05/1

1-piece control lever
refer to Coordinate L13/1

Continue: D22/1

ADJUSTING LOW-IDLE SPEED REGULATION

I M P O R T A N T
Before adjusting low-idle speed regulation, check whether "load-dependent start of delivery" section in test-specification sheet not only indicates speed but also
- quantity difference
- timing-device-travel distance
- supply pump pressure difference.

If differences are given, adjust LFB on pumps with "housing-fixed idle spring" prior to low-idle speed regulation.

Continue: D22/2

ADJUSTING LOW-IDLE SPEED REGULATION

Select further adjustment in accordance with following additional functions:

* Pump with no housing-fixed idle spring Coordinate D23/1

* Pump with housing-fixed idle spring Coordinate D24/1

* Pump with housing-fixed idle spring and difference data in "load-dependent start of delivery" section Coordinate D28/1

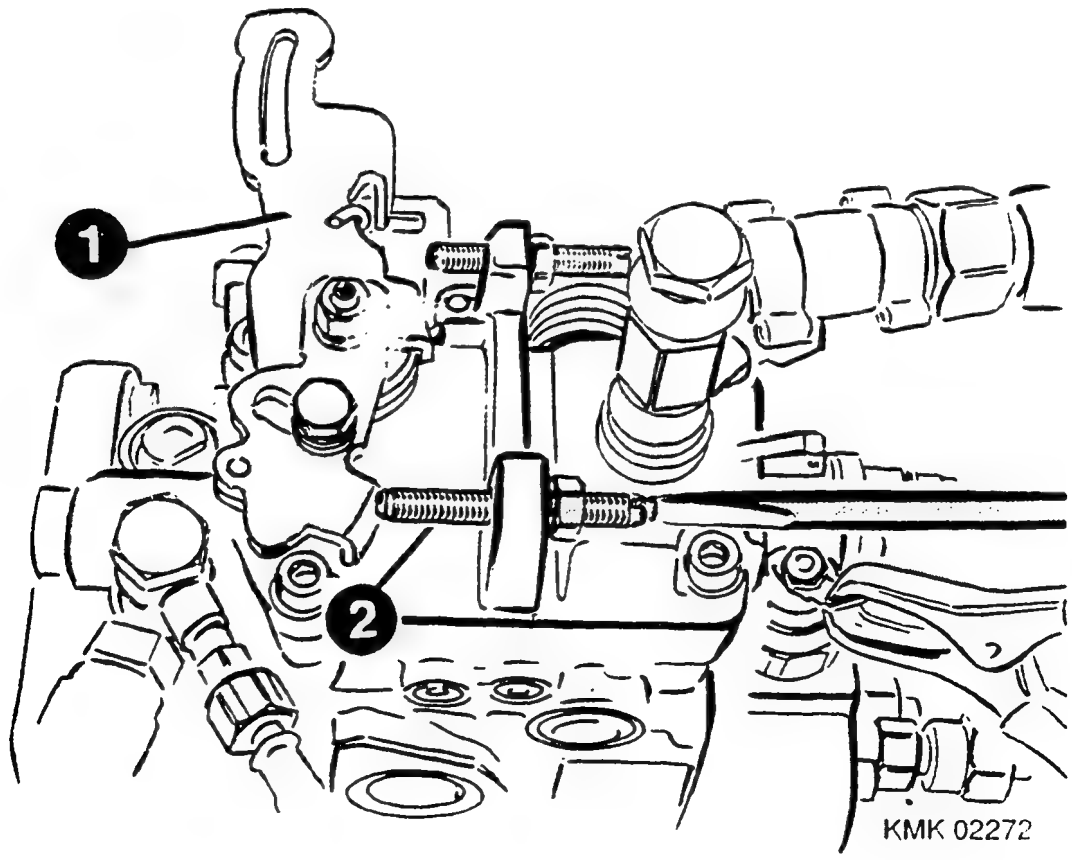
Continue: D23/1

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump without LFG

1 = Speed control lever
2 = Idle adjusting screw

Position control lever at idle adjusting screw.
Set prescribed idle quantity with adjusting screw at stated speed.

Continue: D28/1 Fig.: D27/2



ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Note:
Non-EDP test-specification sheets do NOT indicate the idle quantity under low-idle speed regulation, but rather the residual quantity which must be set prior to idle adjustment.

Terms are marked with letters A - C.
A = Residual quantity adjustment
B = Idle quantity adjustment
C = High idle quantity

Continue: D24/2

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

N O T E :
LFB attachment, right (viewed towards drive)
Idle adjusting screw at LFG lever "left".

LFB attachment, left
Idle adjusting screw at LFG lever "right".

Continue: D25/2

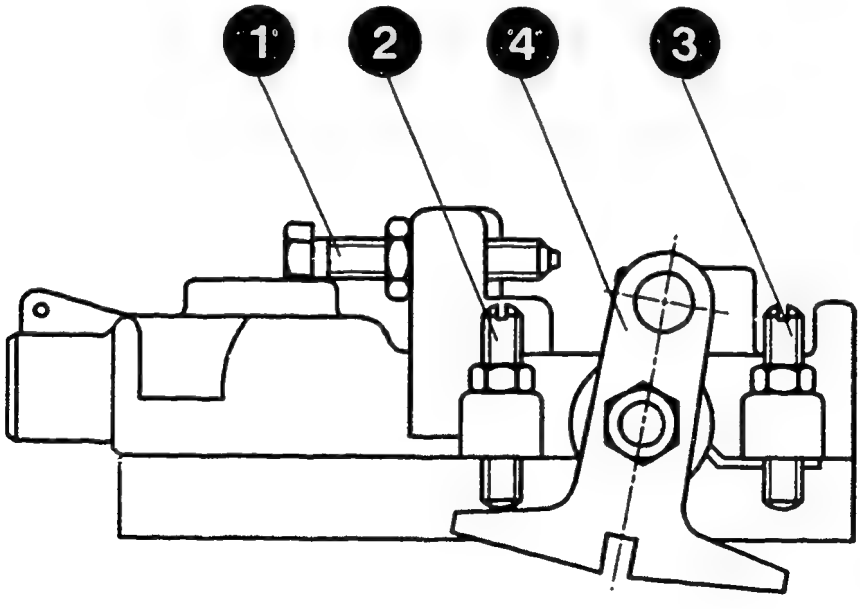
ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Adjusting residual quantity

1 = Residual-quantity adjusting screw
2 = Adjusting screw, low idle
3 = Adjusting screw, high idle
4 = LFG stop lever

Screw out both idle adjusting screws.
Adjust speed as per test-specification sheet.
Measure delivery.
Adjust delivery to center of tolerance by way of residual-quantity adjusting screw.

Continue: D26/1 Fig.: D25/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

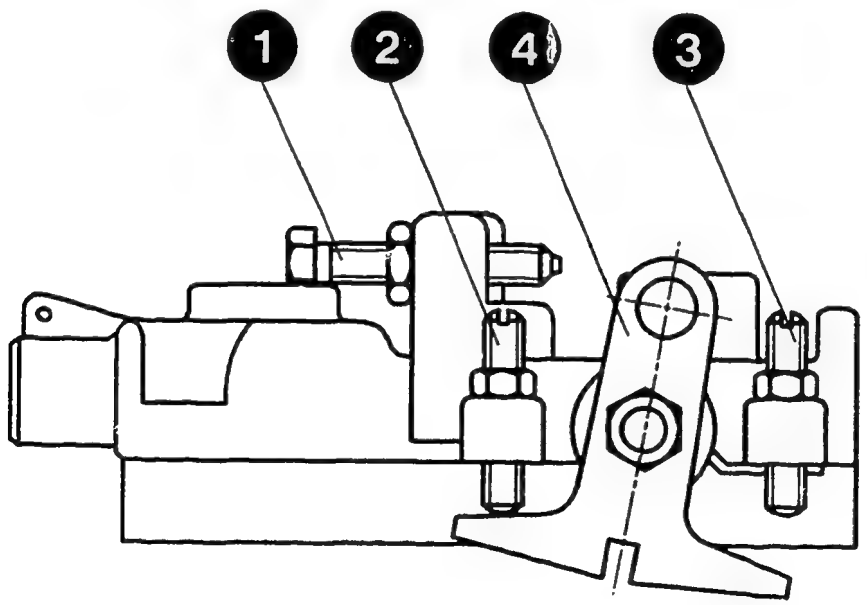
2 = Idle-quantity adjusting screw
4 = LFG stop lever

Adjusting idle quantity

Position LFG stop lever at
idle-quantity adjusting screw.

Set speed as per test-specification
sheet and measure delivery.
Set delivery in center of tolerance by
way of adjusting screw.

Continue: D27/1 Fig.: D26/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

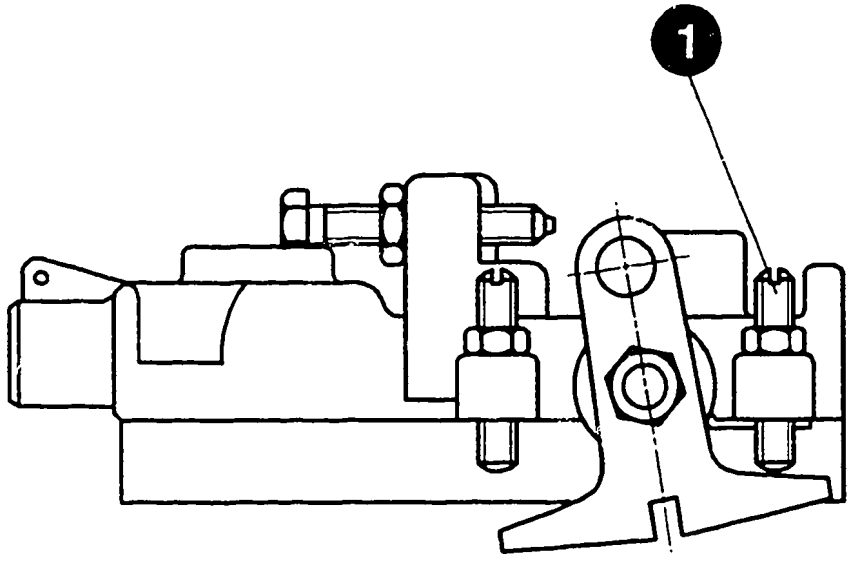
1 = Adjusting screw for high idle

Adjusting high idle quantity

Set speed.
Position LFG stop lever at adjusting screw for high idle.

Measure delivery.
Set delivery for high idle in center of tolerance.

Continue: D28/1 Fig.: D27/2



KMK02274

ADJUSTING LOAD-DEPENDENT START OF DELIVERY (LFB)
Select further adjustment as per test-specification sheet:

* Pump without LFB
  Static governor-shaft adjustment
  Coordinate E01/1

* Pump with LFB
  WITHOUT difference measurement
  Coordinate E02/1

* Pump with LFB
  WITH difference measurement
  Coordinate E04/1

Continue: E01/1

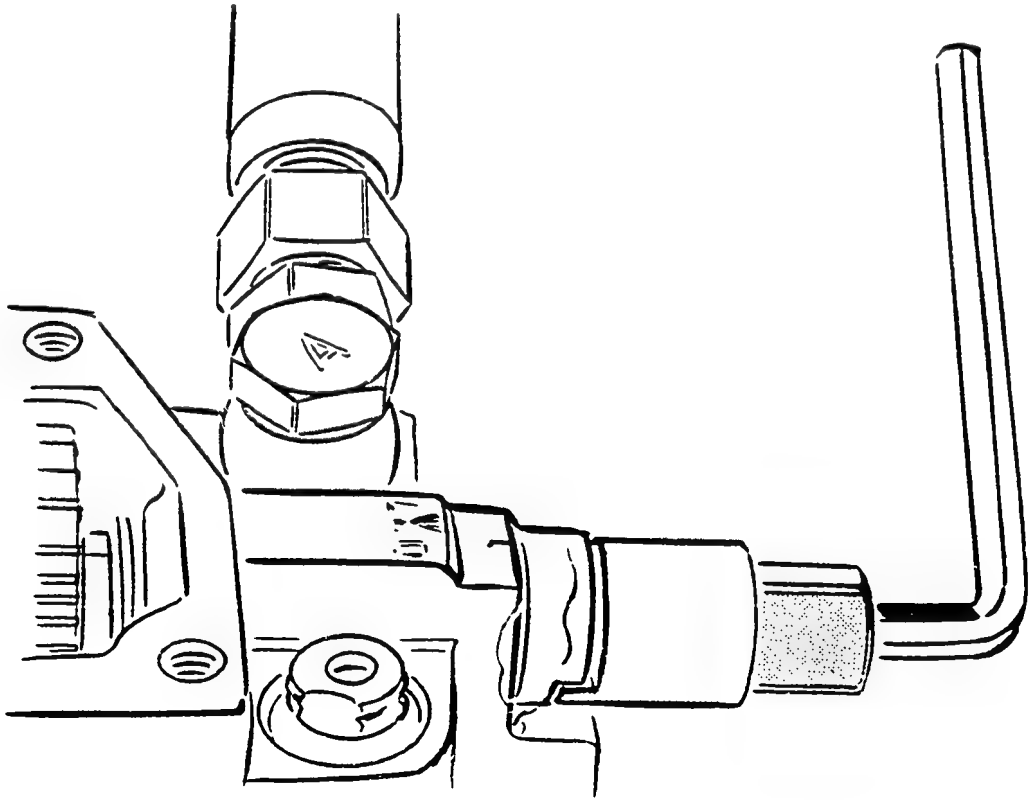
STATIC PRESETTING OF GOVERNOR SHAFT

* No speed indication in test-specification sheet
  Check presetting dimension approx. 1.5 mm of governor shaft

Correction:
Screw in governor shaft with adjusting tool KDEP 1082 for slotted nut or KDEP 1181 for hexagon nut until there is a distance of 1.5 mm between housing flange and end face of governor shaft.

Lock governor shaft.
Tightening torque 22...30 Nm.

Continue: E12/1 Fig.: E01/2



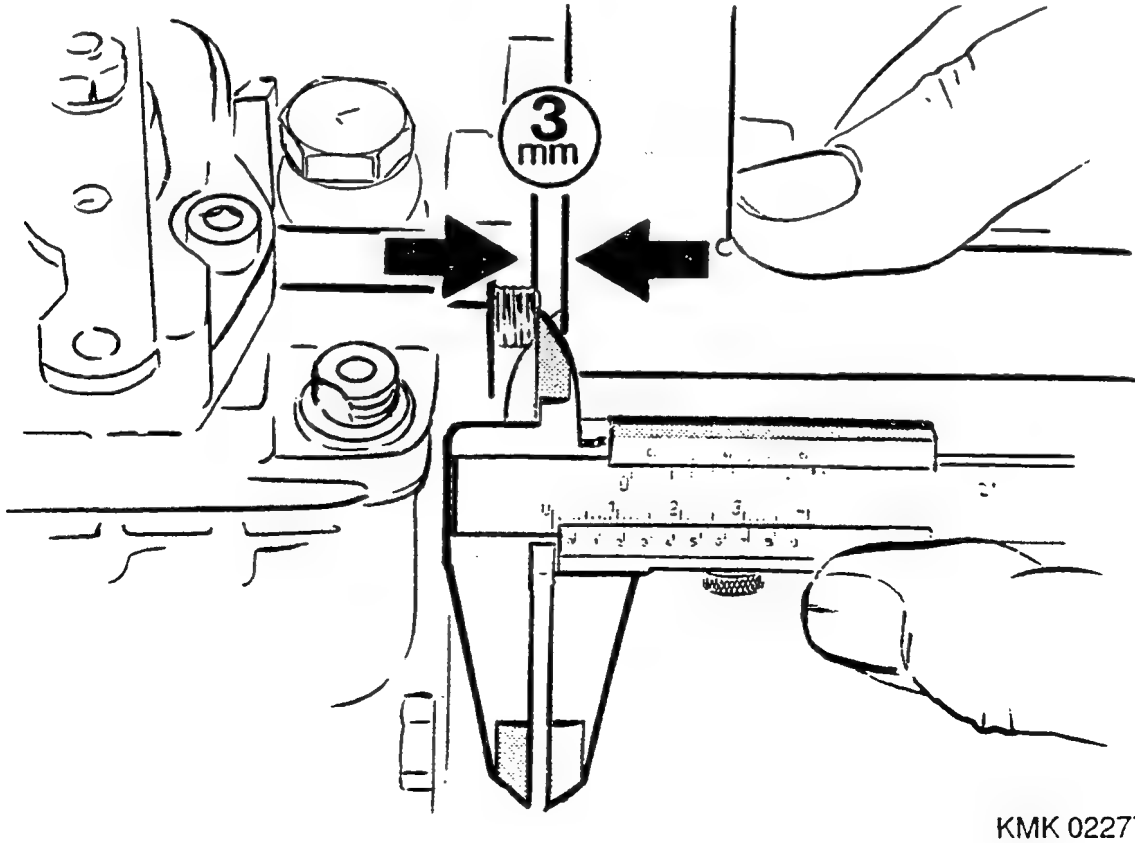
KMK 02278

ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet WITHOUT difference measurement

Establish boost pressure connection as per test-specification sheet.
Set governor shaft to 3.0 mm spacing between housing flange and end face of governor shaft.
Set speed indicated in test-specification sheet.
Screw out governor shaft with setting tool KDEP 1082 or KDEP 1181 until there is a reduction in the supply pump pressure indicated.
IMPORTANT: D A N G E R
O F A C C I D E N T
Wear protective goggles

Continue: E03/1 Fig.: E02/2



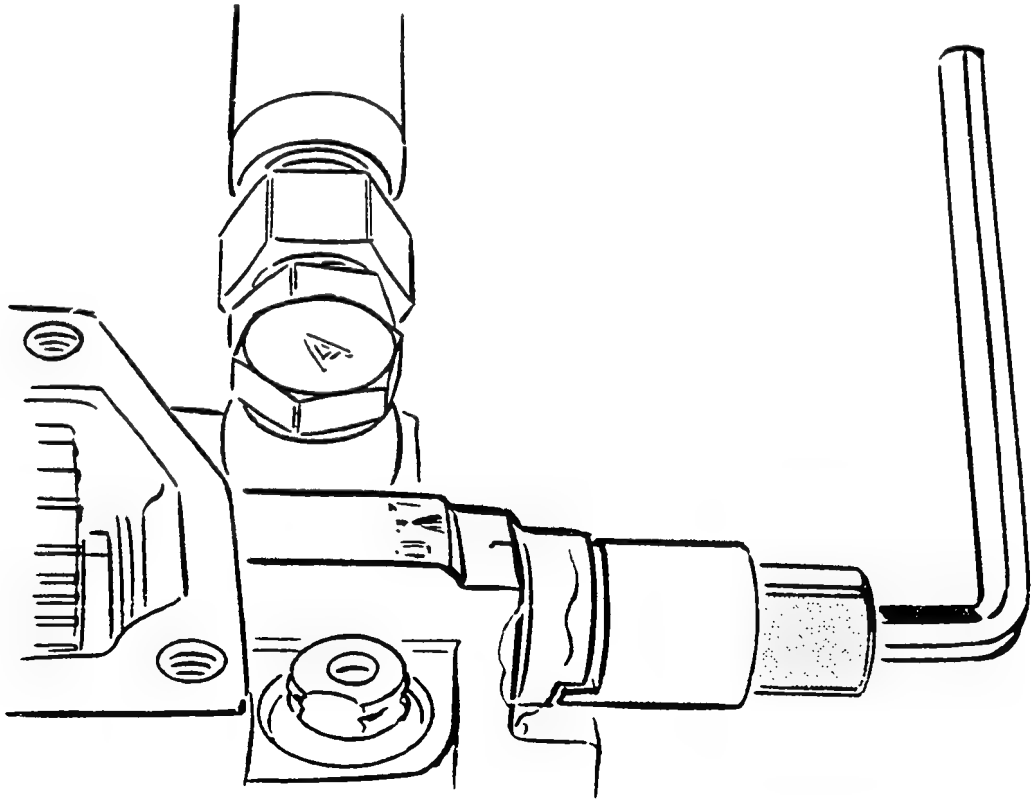
KMK 02277

ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet WITHOUT difference measurement

IMPORTANT: D A N G E R
O F A C C I D E N T
Wear protective goggles
Then screw in governor shaft 1/8 of a turn.
Shut off test bench.
Lock governor shaft with adjusting tool.
In doing so, counter-hold with Allen wrench.
Tightening torque 22...30 Nm.

Continue: E12/1 Fig.: E03/2



KMK 02278

ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet with difference measurement

Set stated speed and boost pressure.
Position control lever against rated-speed adjusting screw.
Measure and note down delivery, timing-device travel and supply pump pressure.

Continue: E05/1

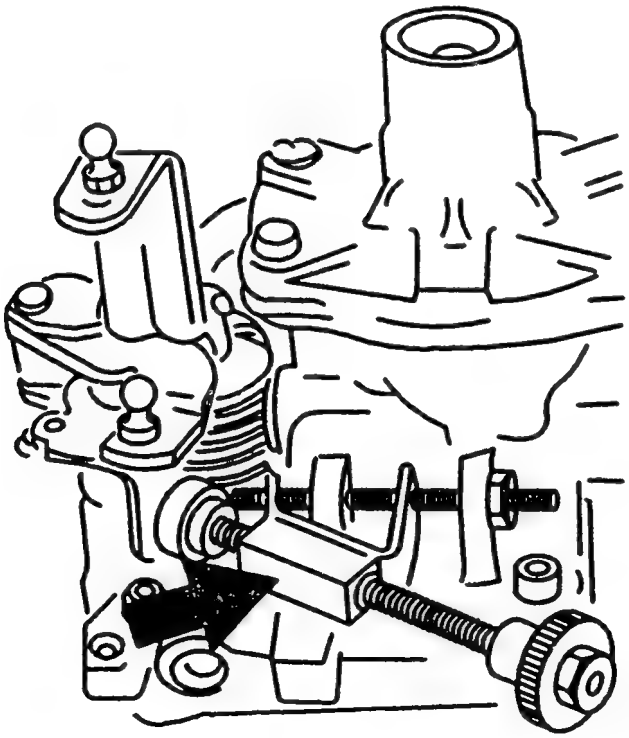
ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet with difference measurement

Arrow = Adjustment screw

Move speed-control lever in direction of idle stop until delivery reduction as per test-specification sheet is obtained.
Hold lever if possible with adjustment screw KDEP 1177 or idle stop screw.

Continue: E06/1 Fig.: E05/2



KMK02279

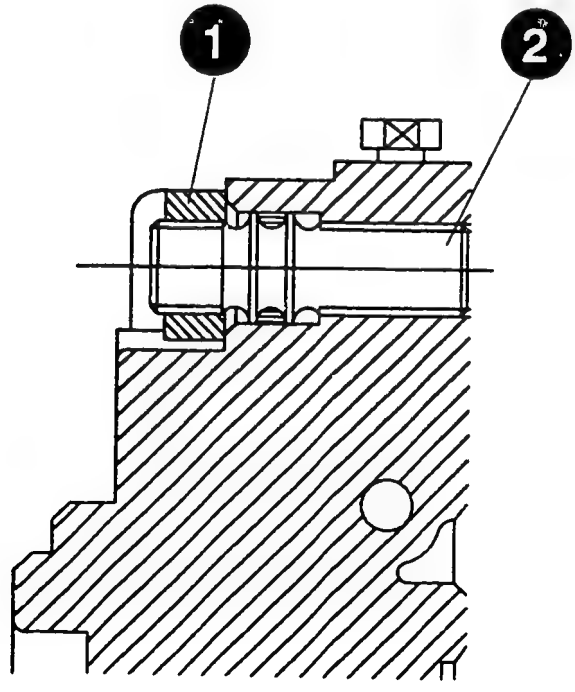
ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet with difference measurement

1 = Slotted/hexagon nut
2 = Governor shaft

IMPORTANT: D A N G E R
O F A C C I D E N T
Wear protective goggles
Turn governor shaft until timing-device travel stated in test-specification sheet and supply pump pressure have been attained.
Note:
Slotted nuts with left-hand thread have yellow surface.
Right-hand thread = white surface

Continue: E07/1 Fig.: E06/2



KMK02956

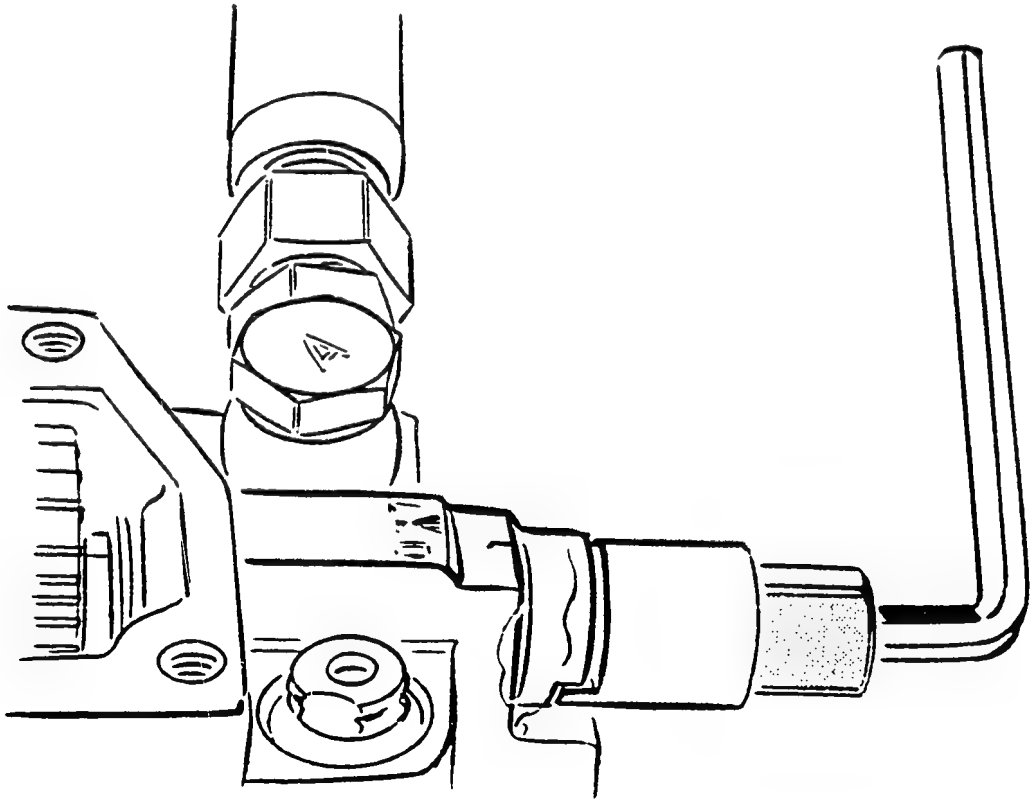
ADJUSTING LOAD–DEPENDENT START OF DELIVERY

* Speed indication in test–specification sheet with difference measurement

IMPORTANT: D A N G E R
O F A C C I D E N T
Wear protective goggles

Lock governor shaft with addusting tool KDEP 1082 (slotted nut) or KDEP 1181 (hexagon nut).
In doing so, counterhold governor shaft with Allen wrench.
Tightening torque for lock nut 22..30 Nm
Check set timing–device travel.

Continue: E08/1 Fig.: E07/2



KMK 02278

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Note:
Non-EDP test-specification sheets do NOT indicate the idle quantity under low-idle speed regulation, but rather the residual quantity which must be set prior to idle adjustment.

Terms are marked with letters A - C.
A = Residual quantity adjustment
B = Idle quantity adjustment
C = High idle quantity

Continue: E08/2

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

N O T E :
LFB attachment, right (viewed towards drive)
Idle adjusting screw at LFG lever "left".

LFB attachment, left
Idle adjusting screw at LFG lever "right".

Continue: E09/1

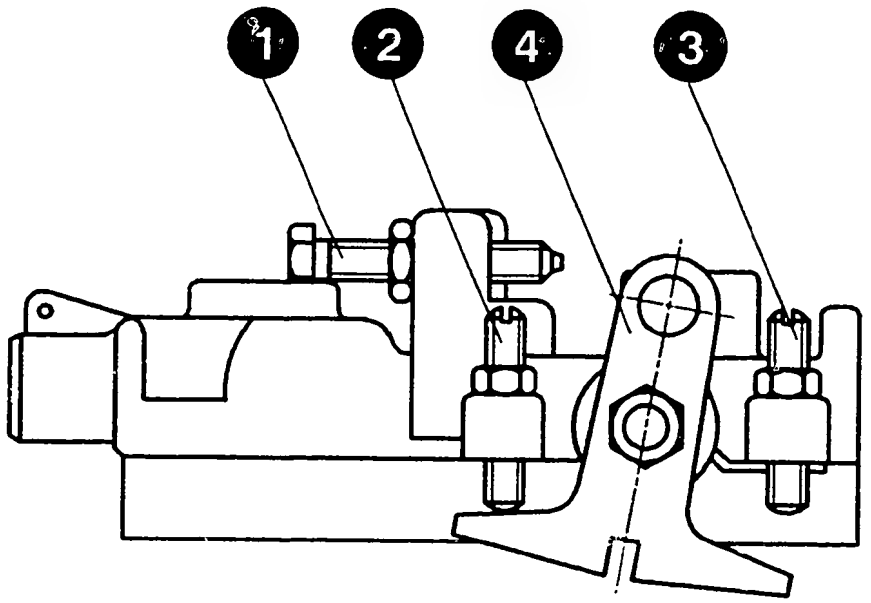
ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Adjusting residual quantity

1 = Residual-quantity adjusting screw
2 = Adjusting screw, low idle
3 = Adjusting screw, high idle
4 = LFG stop lever

Screw out both idle adjusting screws.
Adjust speed as per test-specification sheet.
Measure delivery.
Adjust delivery to center of tolerance by way of residual-quantity adjusting screw.

Continue: E10/1 Fig.: E09/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

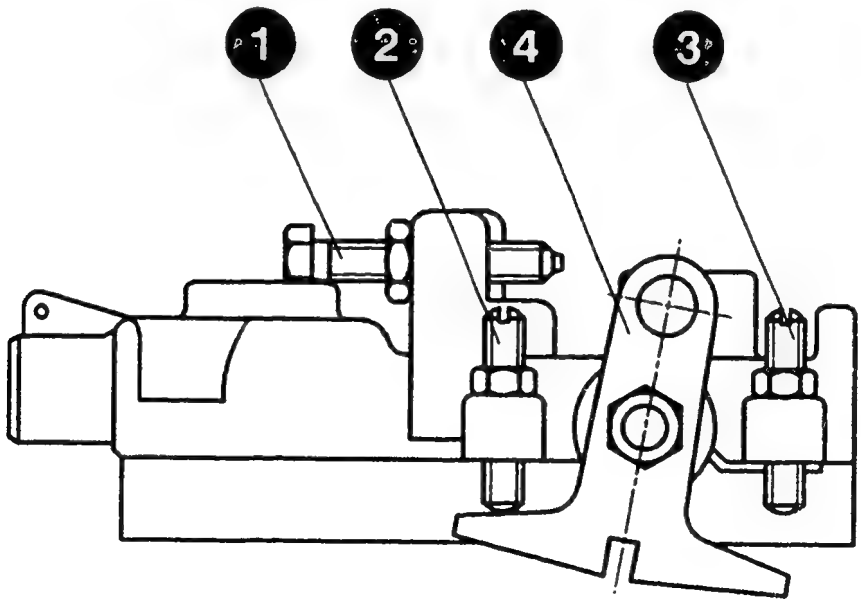
2 = Idle-quantity adjusting screw
4 = LFG stop lever

Adjusting idle quantity

Position LFG stop lever at
idle-quantity adjusting screw.

Set speed as per test-specification
sheet and measure delivery.
Set delivery in center of tolerance by
way of adjusting screw.

Continue: E11/1 Fig.: E10/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

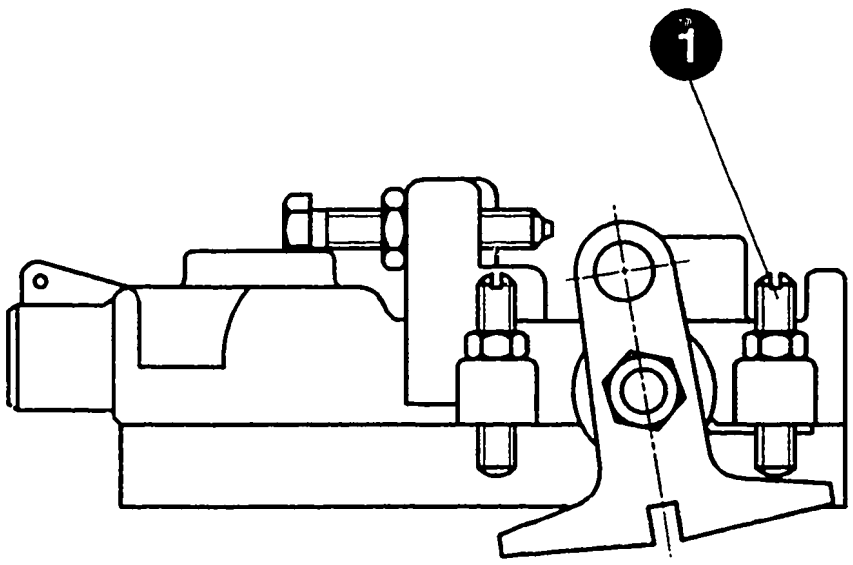
1 = Adjusting screw for high idle

Adjusting high idle quantity

Set speed.
Position LFG stop lever at adjusting screw for high idle.

Measure delivery.
Set delivery for high idle in center of tolerance.

Continue: E12/1 Fig.: E11/2



KMK02274

ADJUSTING MECHANICAL POWER ON/OFF DAMPER (MLD)

Further adjustment in accordance with following additional functions:

	coordinate
* Adjusting damper rate: Pump with mechanical power on/off damper (MLD)	E13/1
* Pump with no mechanical powre on/off damper (MLD)	E14/1

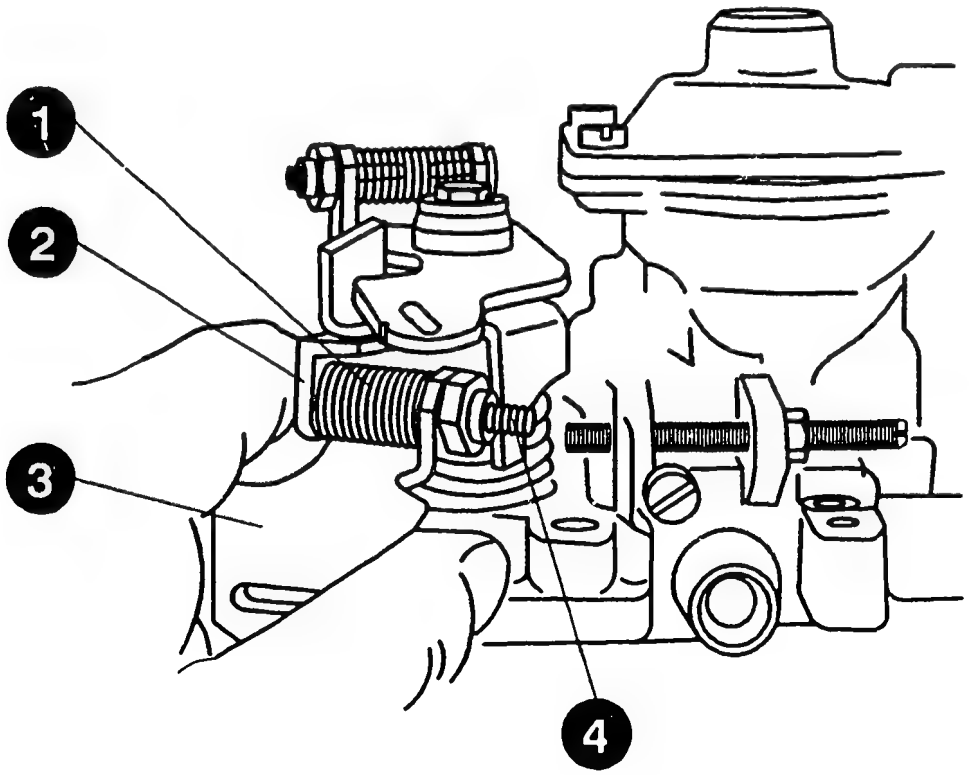
Continue: E13/1

ADJUSTING MECHANICAL POWER ON/OFF DAMPER (MLD)
* Adjusting damper rate

1 = Pressure spring (damping spring)
2 = Clamping lever
3 = Intermediate lever
4 = Adjusting screw

Overcompress damping spring between clamping lever and intermediate lever. Intermediate lever makes contact with residual-quantity stop screw. Adjust damper rate by way of adjusting screw.
Clockwise = less
Counter-clockwise = more

Continue: E14/1 Fig.: E13/2



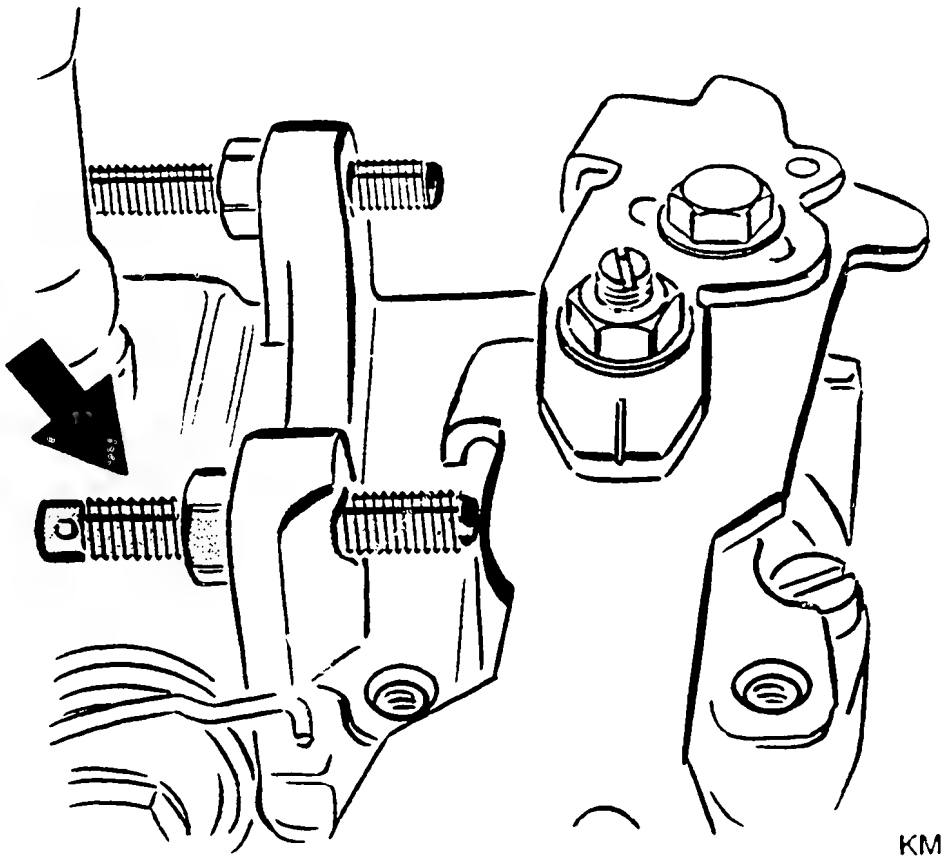
KMK02957

ADJUSTING BREAKAWAY

Arrow = Rated-speed adjusting screw

Apply appropriate boost pressure to fuel-injection pump.
Position control lever against rated-speed adjusting screw.
Screw in adjusting screw until prescribed delivery is obtained at stated speed.

Continue: E15/1 Fig.: E14/2



KMK 02275

MEASURING STARTING FUEL DELIVERY

Position control lever at rated-speed stop.
NOTE:
In the event of deviation e.g. positioning control lever at idle stop, indication is given under Remarks in test-specification sheet.
Measure starting fuel delivery.

Continue: E15/2

MEASURING STARTING FUEL DELIVERY

If starting fuel delivery is not attained, check sleeve-starting travel "MS dimension" in accordance with Section "Calibration work".
For calibration work refer to Coordinate H11/2

If necessary, increase MS dimension (indication on test-specification sheet).
If starting fuel delivery is attained, check idle and full-load speed regulation.

Work through other causes as per repair instructions.

Continue: E16/1

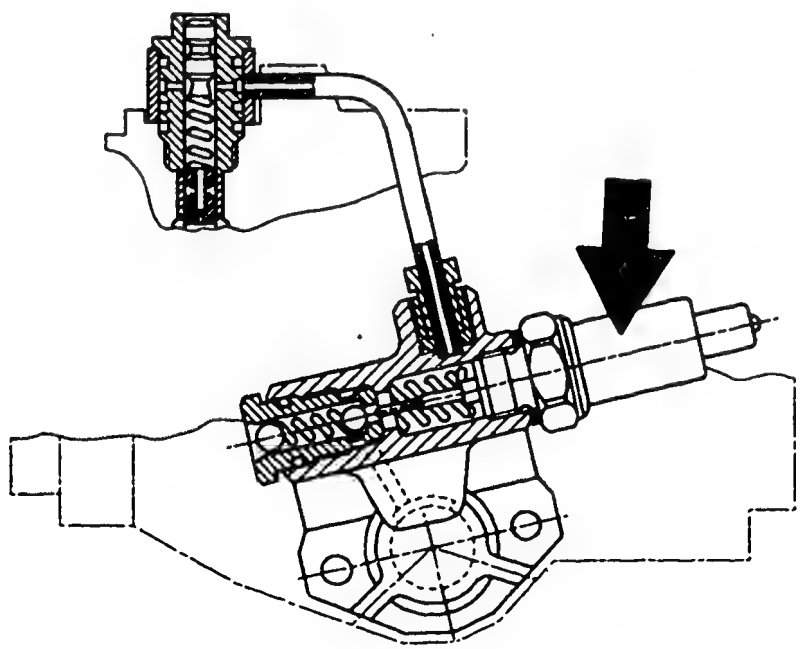
CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

* Checking supply pump pressure

Arrow = Expansion element

If a hydraulic KSB is attached, supply expansion element or pushing/pulling electromagnet with voltage as specified in test-specification sheet.

Continue: E17/1 Fig.: E16/2



KMK02263

ADJUSTING PROFILE OF SUPPLY PUMP PRESSURE

Set boost pressure at restrictor as per test-specification sheet.
Position speed-control lever against rated-speed adjusting screw.
At the indicated speeds, the profile of the supply pump pressure and that of the timing device must be within the adjustment tolerance (setting not in brackets).

Continue: E17/2

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

Faults with the supply pump or pressure regulator affect the timing-device travel and supply pump pressure profile.

A fault in the timing device (incorrect spring) only affects the timing-device travel profile.

Continue: E18/1

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

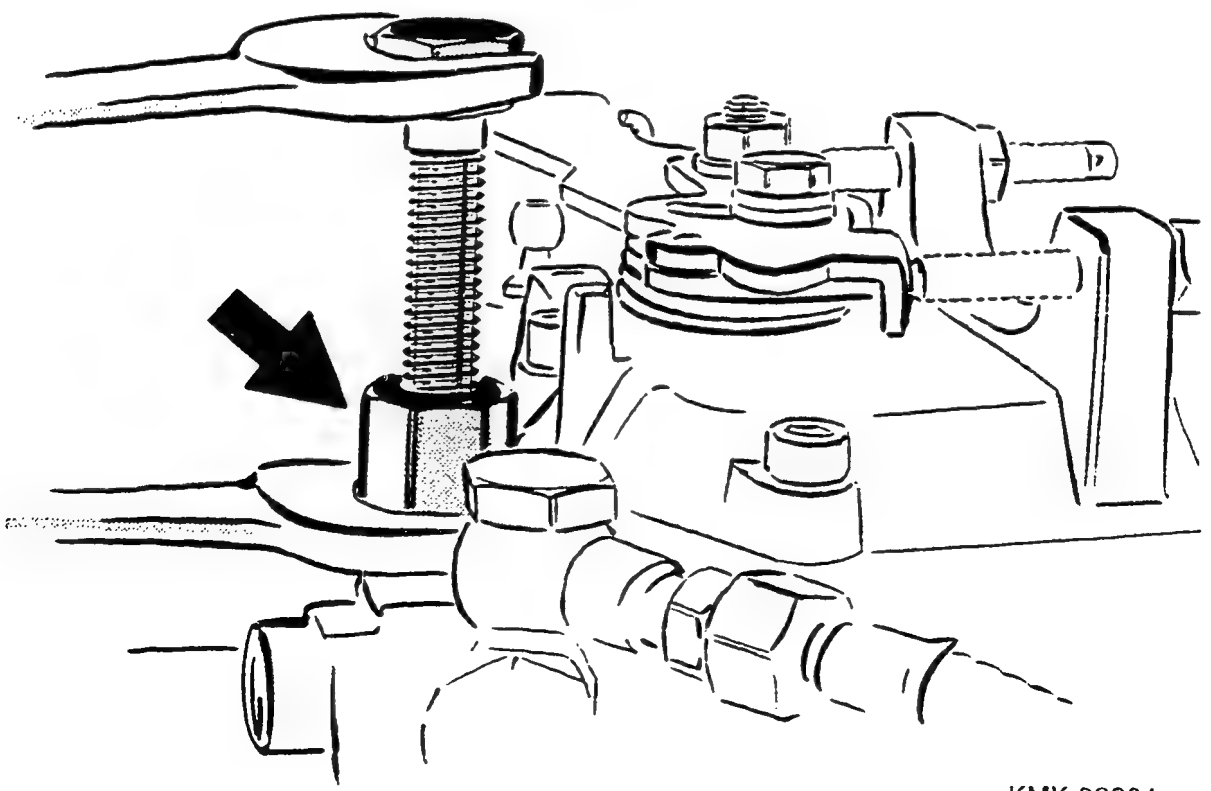
* Supply pump pressure too low:

Effect correction as follows.

Push pressing-in tool KDEP 1092 onto pressure regulator and turn through 90°. Counterhold with open-ended wrench (arrow).

Pressing in the plug with the pressing-in tool increases the supply pump pressure and thus advances the timing device (increased timing-device travel).

Continue: E19/1 Fig.: E18/2



KMK 02264

CHECKING AND ADJUSTING SUPPLY PUMP
PRESSURE PROFILE

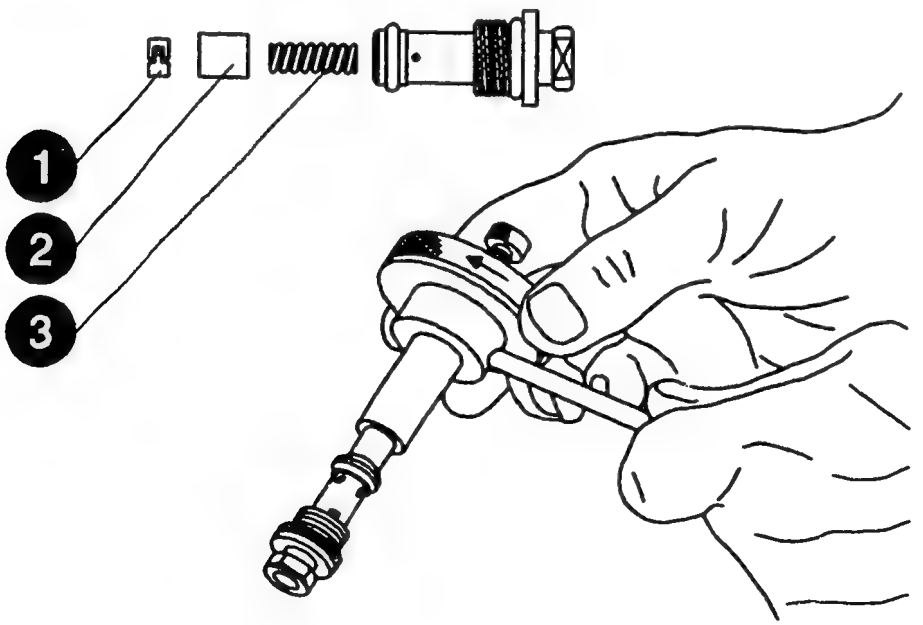
1 = Slotted spring pin
2 = Piston
3 = Pressure spring

* Supply pump pressure too high:

Correct as follows:

Remove pressure regulator with socket wrench KDEP 1086.
Remove slotted spring pin with puller KDEP 1027.
Remove piston and pressure spring.

Continue: E20/1 Fig.: E19/2



KMK02265

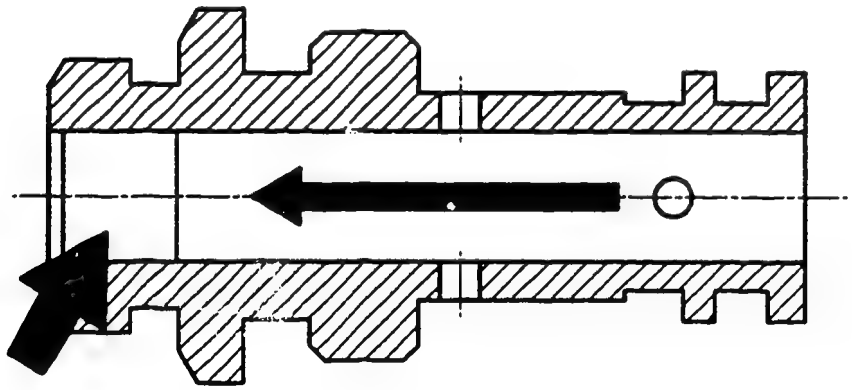
CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

Arrow = Plug

Press out plug.

Then re-install pressure spring and piston in pressure regulator.

Continue: E21/1 Fig.: E20/2



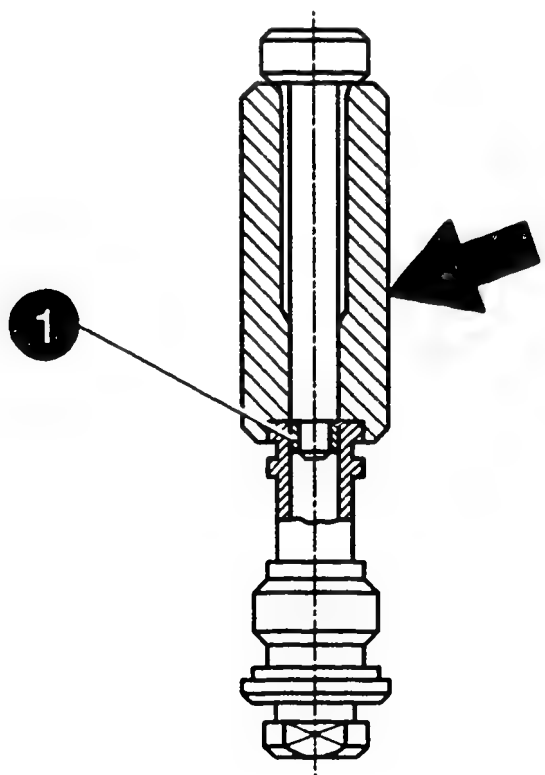
KMK02266

ADJUSTING PROFILE OF SUPPLY PUMP PRESSURE

1 = Clamping sleeve

Press in new clamping sleeve with pressing-in tool KDEP 1093 (arrow) such that it is flat.
Install pressure regulator and tighten to tightening torque 7...10 Nm.
Repeat adjustment of supply pump pressure.

Continue: E22/1 Fig.: E21/2



KMK02267

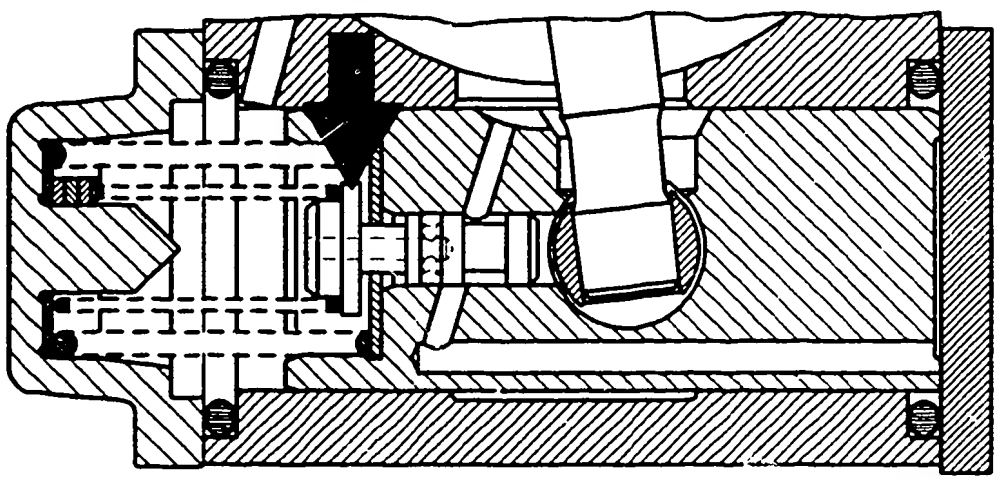
ADJUSTING PROFILE OF SUPPLY PUMP PRESSURE

Arrow = Control plunger

Eliminate cause as per repair instructions if supply pump pressure not obtained.

NOTE:
If timing-device version with follow-up piston (NLK) is installed, check control plunger for freedom of movement before disassembling pump.
* Pump W I T H N O follow-up piston, continue on Coordinate E25/1

Continue: E23/1 Fig.: E22/2



KMK 02943

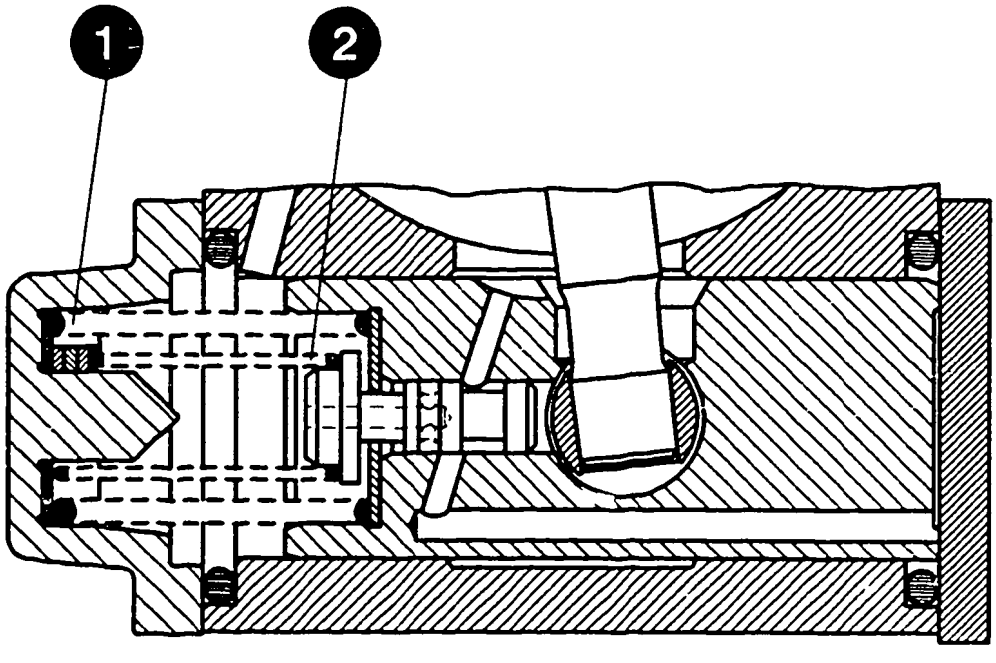
ADJUSTING SUPPLY PUMP PRESSURE

1 = Timing-device spring
2 = Return spring (control plunger)

To do so, remove timing-device cover on spring end.
Pay attention to spaces in timing-device cover and timing-device piston.
Note: There should not be more than 2 shims in the timing-device cover for pretensioning spring of control plunger.

Remove timing-device spring and return spring from control plunger.

Continue: E24/1 Fig.: E23/2



KMK 02944

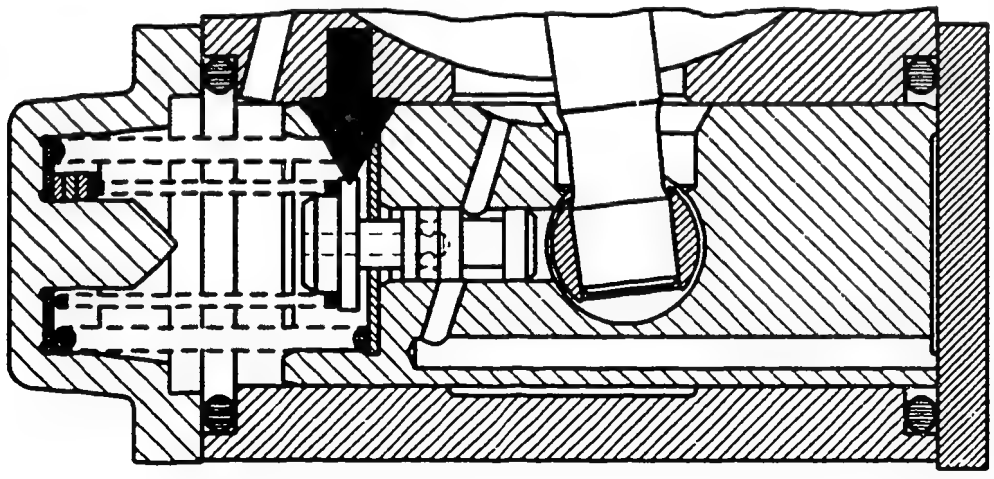
ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Control plunger

Remove control plunger and check for freedom of movement.
Fit parts and repeat adjustment of supply pump pressure.

Eliminate cause in line with repair instructions if supply pump pressure is not obtained.

Continue: E25/1 Fig.: E24/2



KMK 02943

CHECKING AND ADJUSTING HYDRAULIC COLD-START ACCELERATION DEVICE (KSB)

Select adjustment in accordance with following add-on modules:

- Checking VE pump with no hydraulic cold-start acceleration device (KSB)
  Coordinate E26/1

- Checking VE pump with hydraulic cold-start acceleration device
  Coordinate F05/1

Continue: E26/1

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

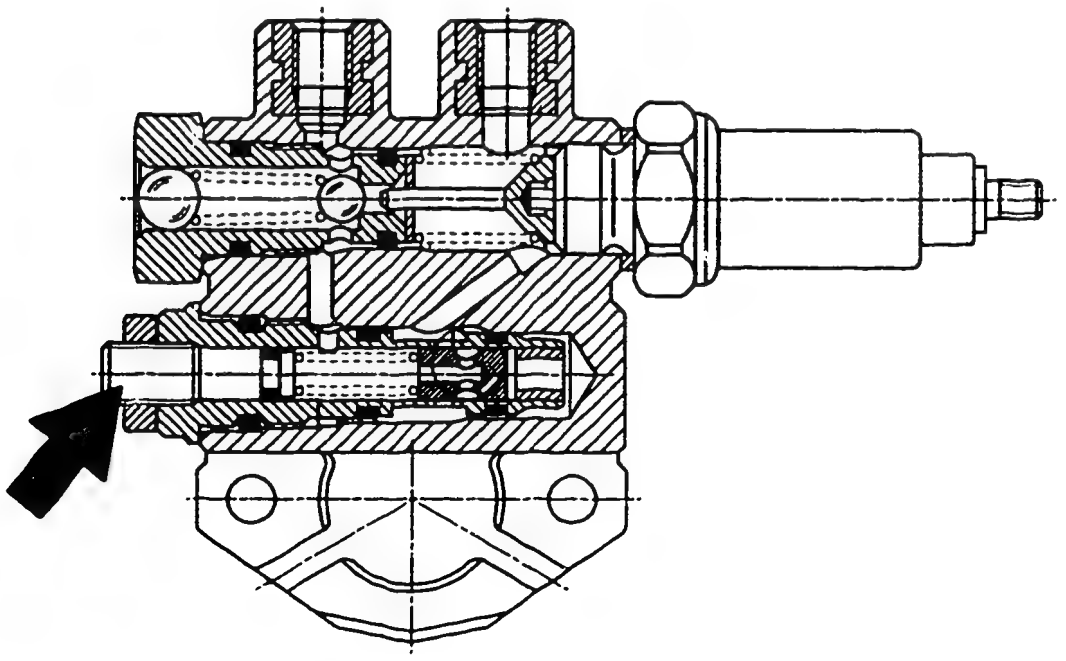
1 = Adjusting screw

Select adjustment in line with following add-on modules:

KSB profile not externally adjustable
No adjusting screw
Coordinate E27/1

KSB profile adjustable by way of adjusting screw
Coordinate F01/1

Continue: E27/1 Fig.: E26/2



KMK02280

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

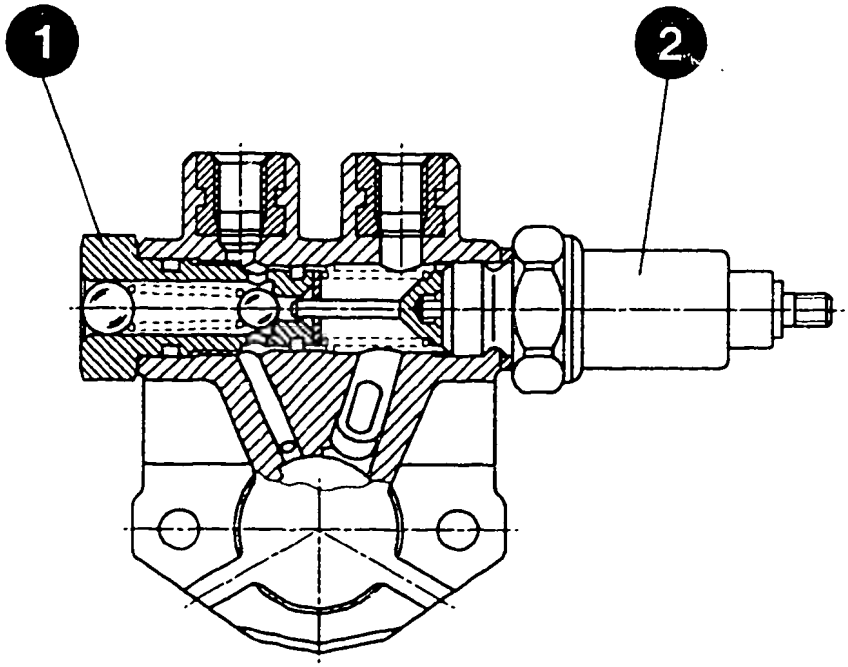
* Version not adjustable by way of adjusting screw

1 = KSB ball valve
2 = Expansion element

* Checking KSB profile "engine cold"
  Remove voltage supply at expansion element or solenoid valve.

Allow KSB to cool down.
Screw out ball valve approx. 2 mm.
Set speed for KSB adjustment point and measure timing-device travel.
Adjust KSB cut-in point if timing-device travel is not obtained.

Continue: E28/1 Fig.: E27/2



KMK02281

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

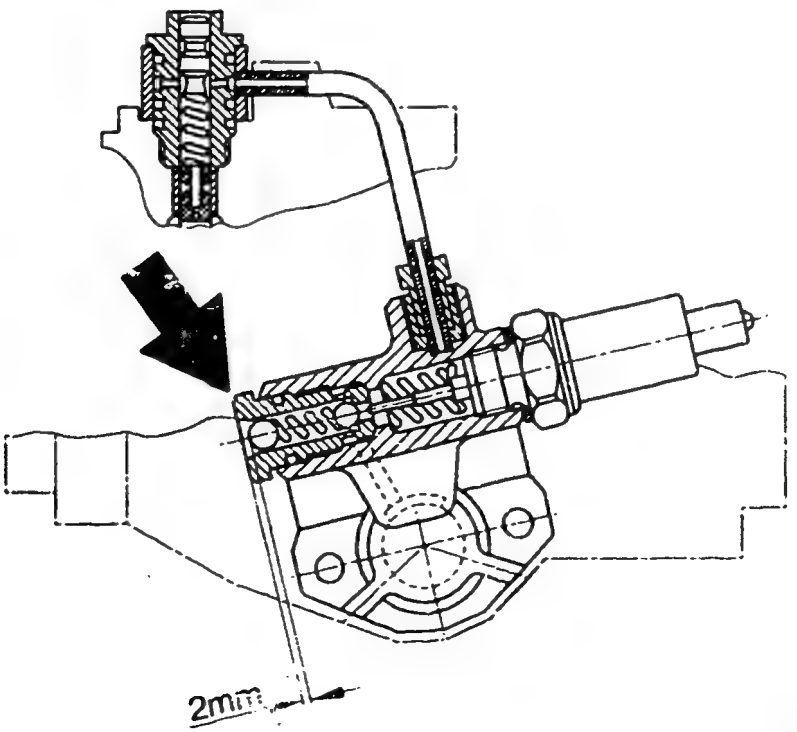
Arrow = KSB ball valve

* Adjusting KSB cut-in point
  - KSB travel inadequate

At stated speed, carefully knocking ball valve until timing-device travel is obtained.
Replace ball valve if timing-device travel cannot be set.

Perm. knock-in depth for ball 2 mm.

Continue: F05/1 Fig.: E28/2



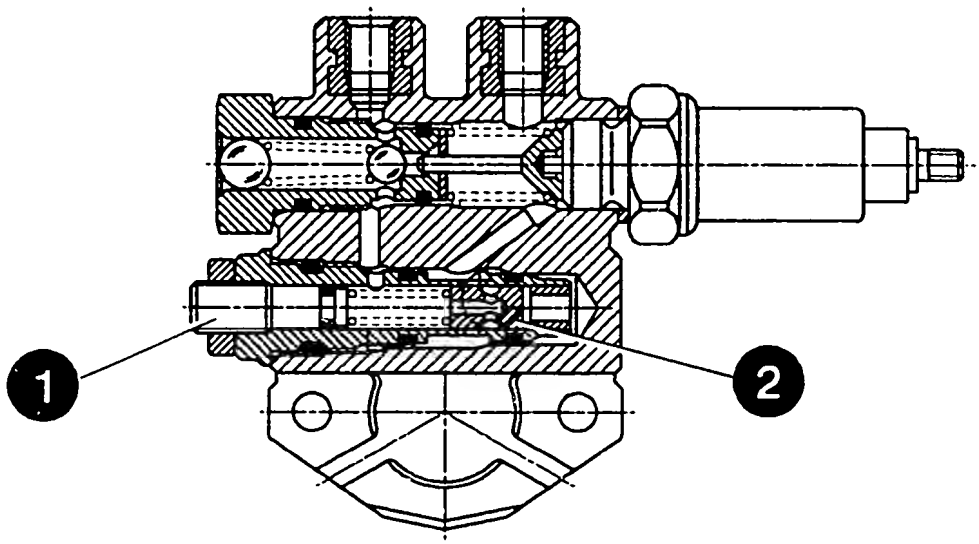
KMK02958

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

1 = Adjusting screw
2 = Safety cutout

The following text refers to externally adjustable KSB version. In the case of this version with safety cutout in the adjusting screw (separate from pressure regulator), the KSB profile is set by way of the adjusting screw.

Continue: F02/1 Fig.: F01/2



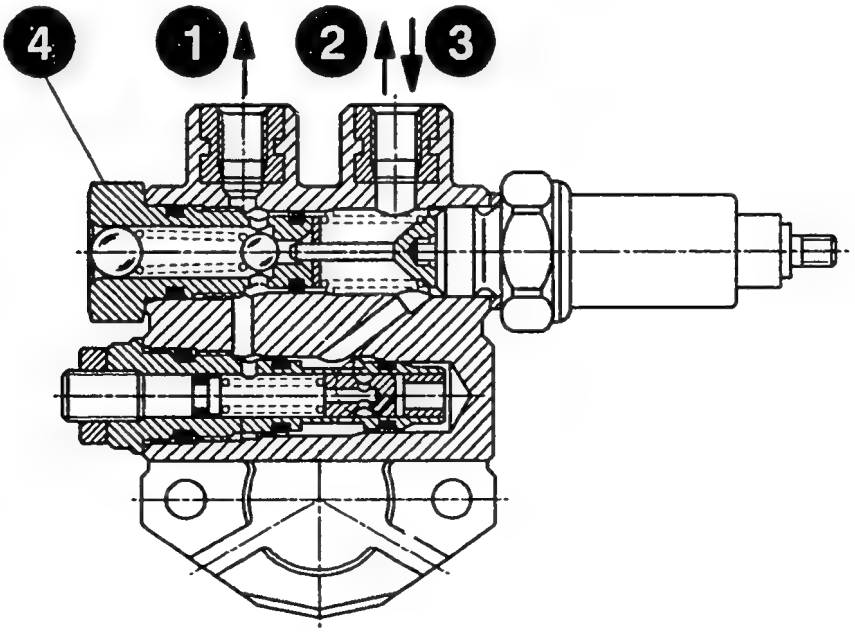
KMK02283

CHECKING AND ADJUSTING HYDRAULIC COLD-START ACCELERATION DEVICE (KSB)

* Connection diagram

1 = to intake side
2 = to HBA
3 = to pressure regulator
4 = ball valve

Continue: F03/1 Fig.: F02/2



KMK02959

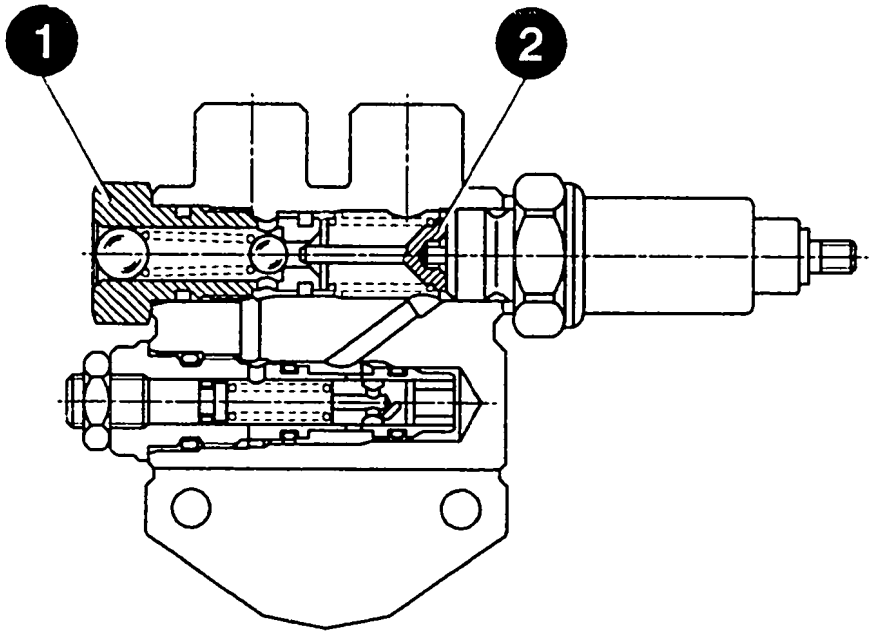
CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

1 = Ball valve
2 = Thrust piece

* Checking KSB profile "engine cold"

Remove voltage supply at expansion element.
Remove expansion element or solenoid valve and take out thrust piece.
Fit expansion element or solenoid valve.

Continue: F04/1 Fig.: F03/2



KMK02285

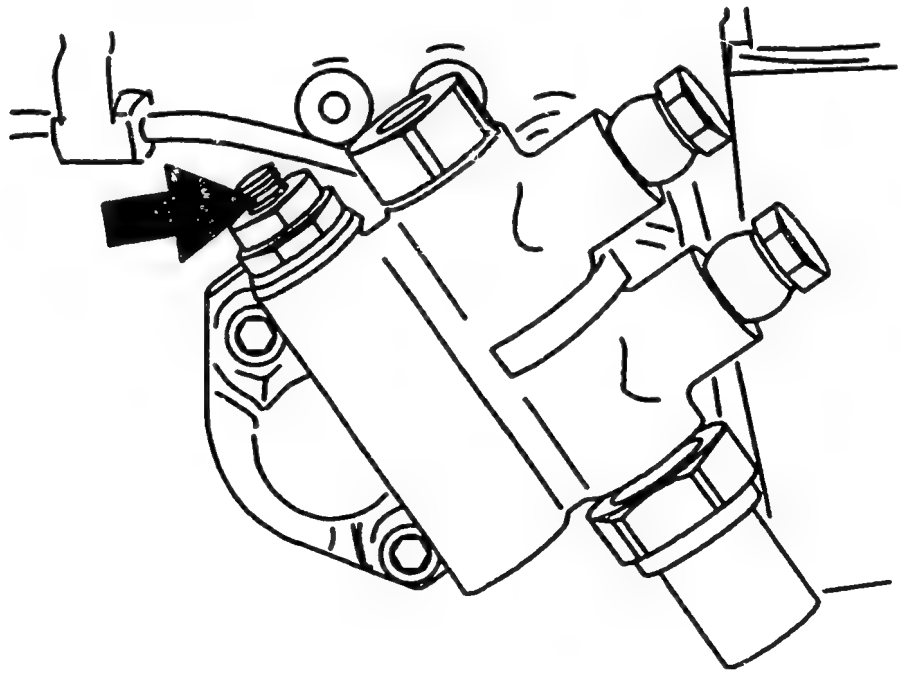
CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

Arrow = Adjusting screw

* Checking KSB profile "engine cold".

Set adjustment speed "A" as per test-specification sheet and adjust timing-device travel if necessary by way of adjusting screw.
Set speed "B" and check KSB profile.
Install thrust piece.
Apply voltage supply to expansion element and check timing-device profile.

Continue: F05/1 Fig.: F04/2



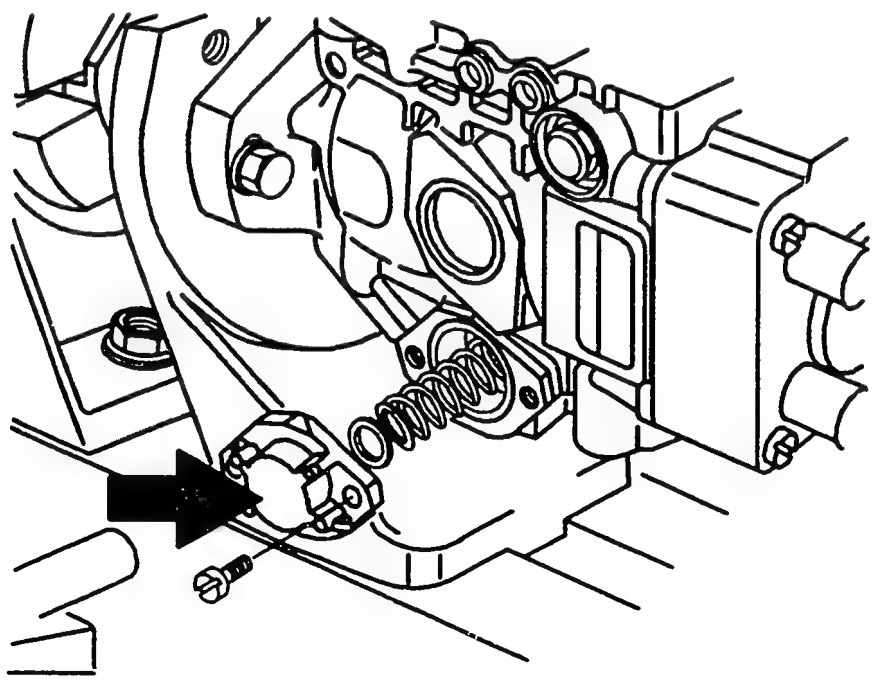
KMK02286

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

Arrow = Timing-device cover

Position speed-control lever against rated-speed adjusting screw.
Make boost pressure connection.
The timing-device profile must be within the adjustment tolerance at the stated speeds. If the prescribed timing-device travel is not obtained with utilization of the tolerance for the supply pump pressure, check timing device shims.
Remove timing-device cover (on spring end).

Continue: F06/1 Fig.: F05/2



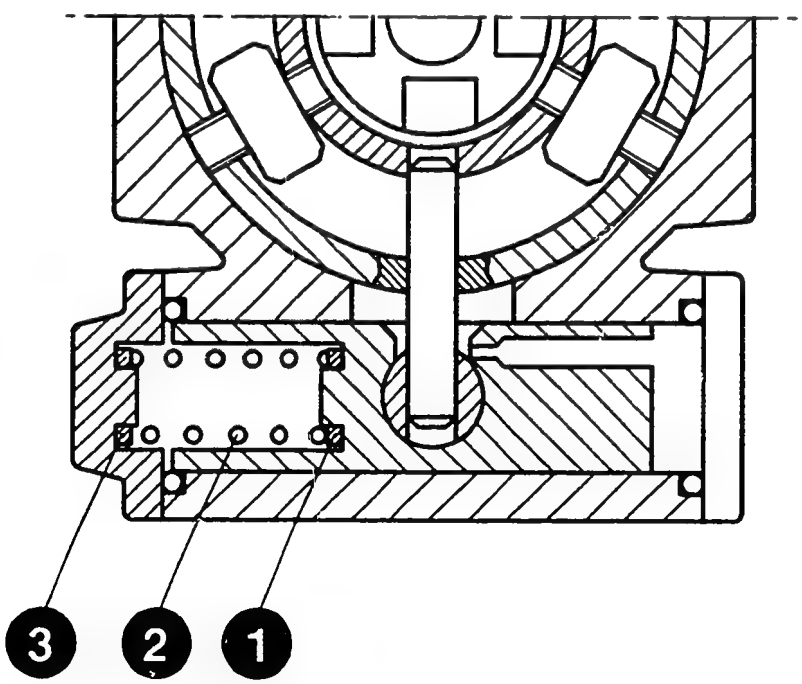
KMK02268

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

1 = Shim
2 = Pressure spring
3 = Timing-device shims

Measure thickness of shims comprising:
 * Items 1 and 3
(Allow for shim 1) and compare to dimension "SVS" as per test-specification sheet.
Insert approx. 0.6 mm thick shim in timing-device piston.
Insert pressure spring.

Continue: F07/1 Fig.: F06/2



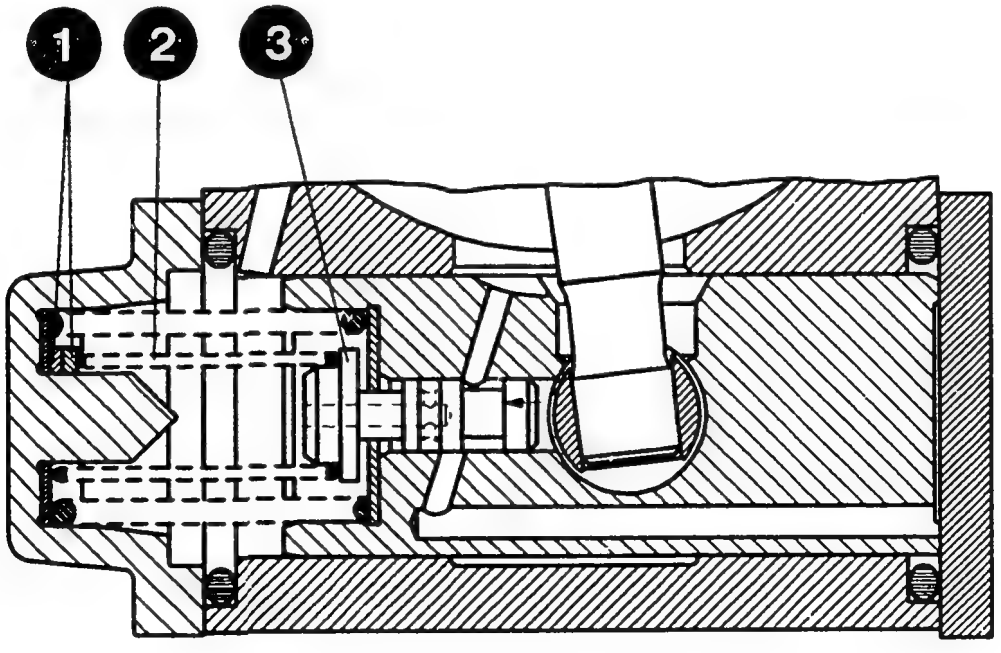
KMK02269

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

1 = Shims
2 = Return spring
3 = Control plunger

NOTE:
If a timing-device version with follow-up piston (NLK) is fitted, adjust timing-device profile by exchanging shims under return spring of control plunger.
Not more than 2 shims may be fitted.

Continue: F08/1 Fig.: F07/2



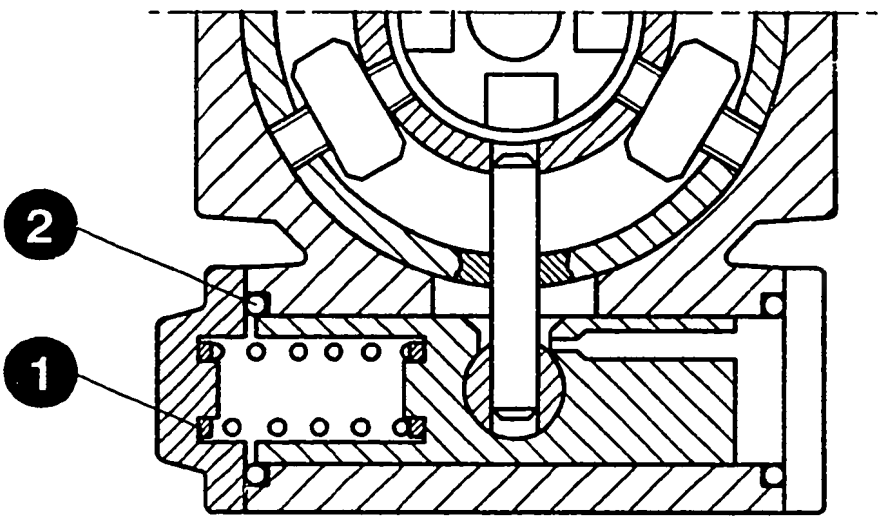
KMK 02960

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

1 = Timing-device shims
2 = Sealing ring

Insert sealing ring and install cover with remaining shims (which produce dimension "SVS").
Note:
There must be at least 1 shim on either side of pressure spring.

Continue: F09/1 Fig.: F08/2



KMK02358

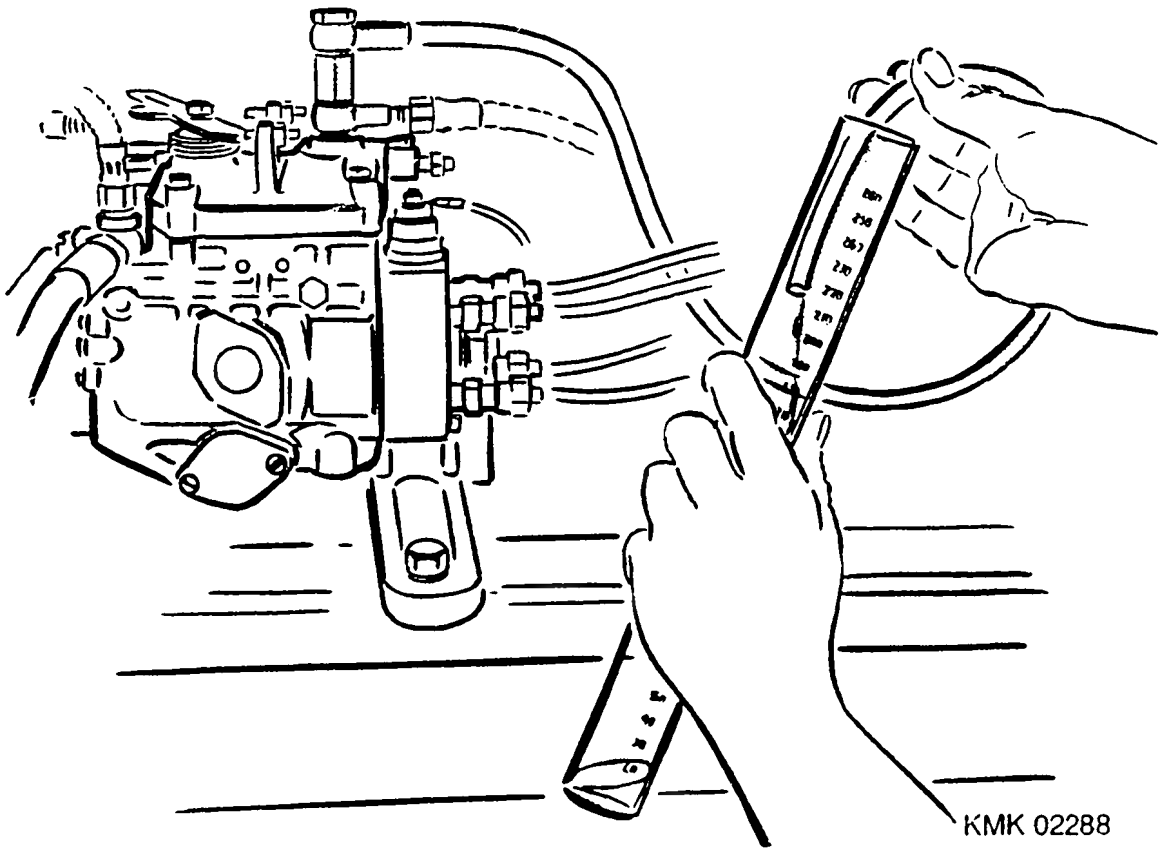
MEASURING OVERFLOW

Position control lever against rated-speed adjusting screw.

Adjust boost pressure at restrictor in line with test-specification sheet. Measure overflow at return with appropriate graduate at specified pump speed.

If overflow is outside tolerance, check overflow restrictor as stated in test-specification sheet or service-parts list/replace.

Continue: F10/1 Fig.: F09/2



CHECKING DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP WITH:

Select further adjustment
in accordance with following
additional functions:

	Coordinate
* Boost-pressure dependent full load stop (LDA) Version: LDA housing	F11/1
* Boost-pressure dependent full load stop (LDA) Version: External LDA	F13/1
* Hydraulic torque control (HBA)	F27/1

Continue: F11/1

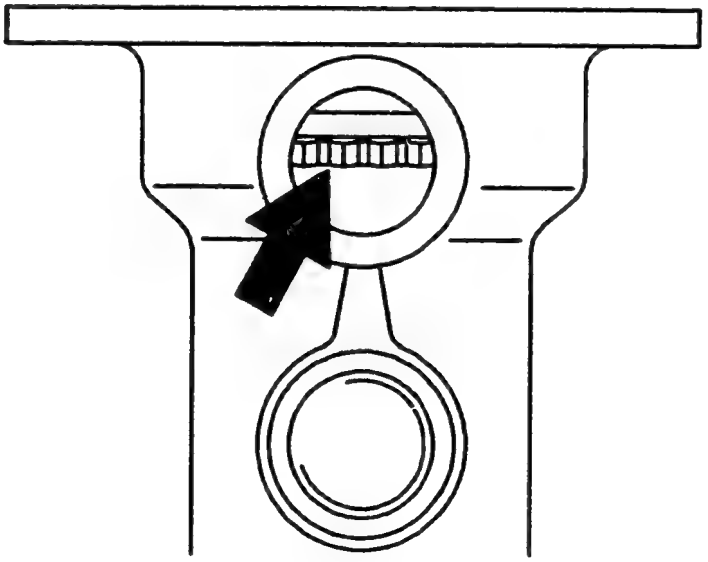
F10 —

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with LDA housing

Arrow = Adjusting nut

Apply appropriate boost pressure to injection pump as marked with * in test-specification sheet (starting point of LDA).
Correct delivery by turning adjusting nut.
Counter-clockwise = greater delivery
Clockwise = smaller delivery
Check delivery.

Continue: F12/1 Fig.: F11/2



KMK02961

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with LDA housing

Set boost pressure at restrictor in line with test-specification sheet. Measure deliveries at stated speeds. Eliminate cause in line with repair instructions if delivery is not obtained.

Continue: G05/1

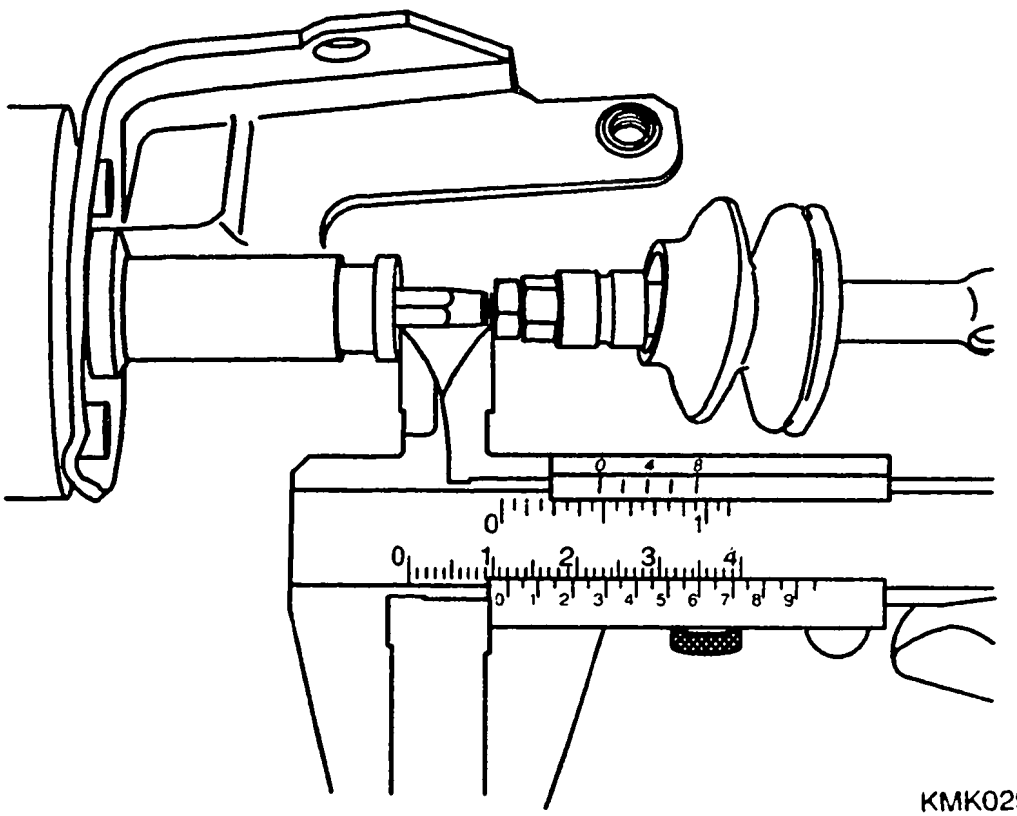
CHECKING DELIVERY AND BREAKAWAY PROFILE

* Pump with external LDA

* Check diaphragm stroke

Remove boost-pressure connection.
Detach external LDA.
Measure distance between hexagon nut and housing collar (see picture).
Then apply 300 hPa to aneroid capsule and determine diaphragm stroke in horizontal position.
Adjust boost pressure starting from 0 hPa.
The difference between the two values must be 11.0...13.0 mm.
Renew aneroid capsule if diaphragm stroke is not obtained.

Continue: F14/1 Fig.: F13/2



KMK02962

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

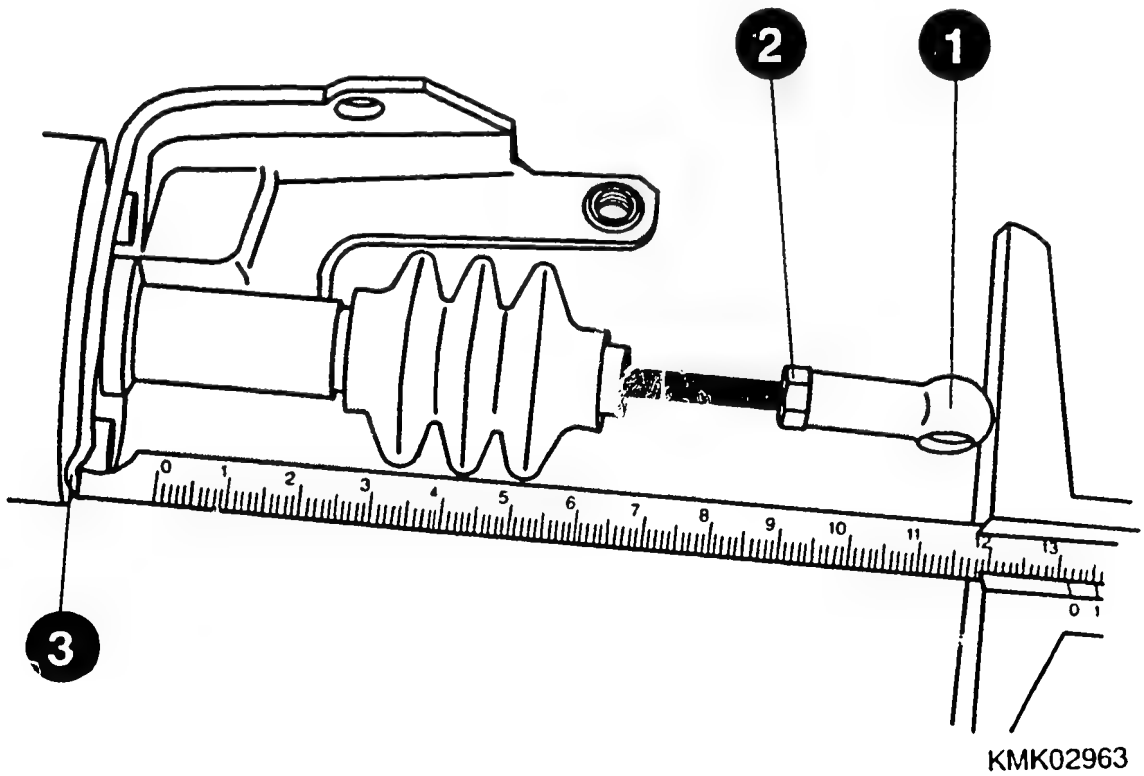
1 = Ball socket
2 = Lock nut
3 = Aneroid-capsule holder

* Check overall travel of lifting rod:
Prerequisite:
Diaphragm stroke obtained

Use depth gauge to determine overall travel from holder to ball socket.

Set value: 133.1...134.1 mm
with 300 hPa.

Continue: F15/1 Fig.: F14/2



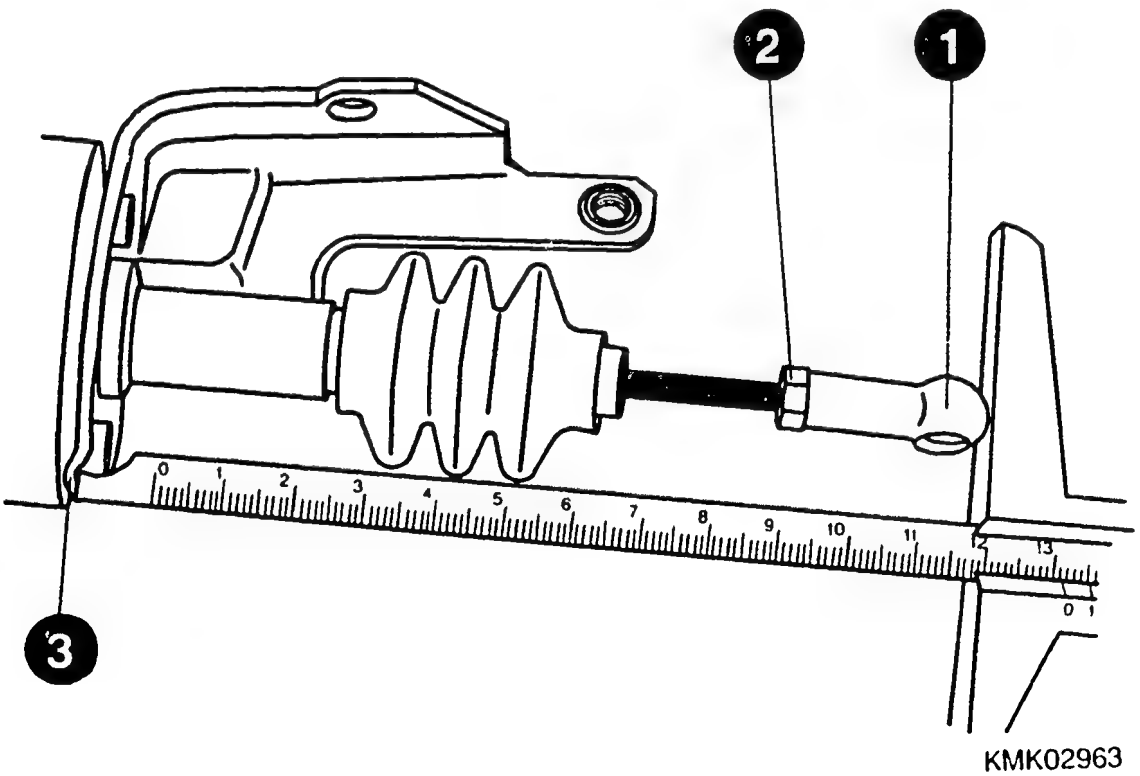
KMK02963

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Ball socket
2 = Lock nut

Loosen lock nut if adjustment dimension is not obtained.
Adjust overall travel by turning ball socket.

Continue: F16/1 Fig.: F15/2

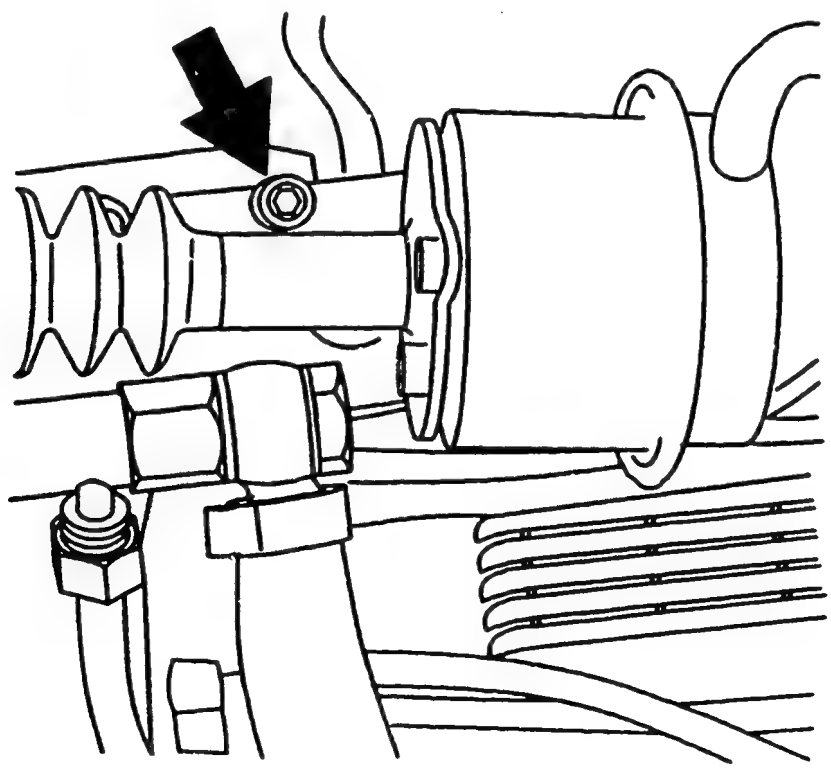


CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

Arrow = Hexagon-socket-head cap screw

Attach external LDA.
Mount LDA on support bracket and tighten wtih hexagon-socket-head cap screws.
Tightening torque 8...10 Nm.

Continue: F17/1 Fig.: F16/2



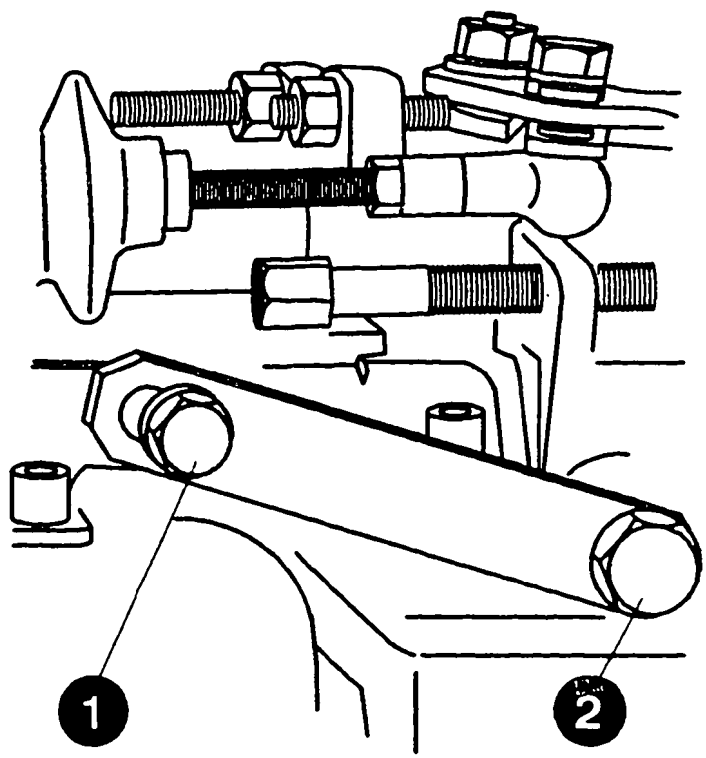
KMK02964

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Hexagon bolt
2 = Hexagon bolt

Screw retaining bracket to LDA
and stop housing.
Hexagon bolt (1) 6 mm:
Tightening torque 6...9 Nm
Hexagon bolt (2) 8 mm:
Tightening torque 10...15 Nm

Continue: F18/1 Fig.: F17/2



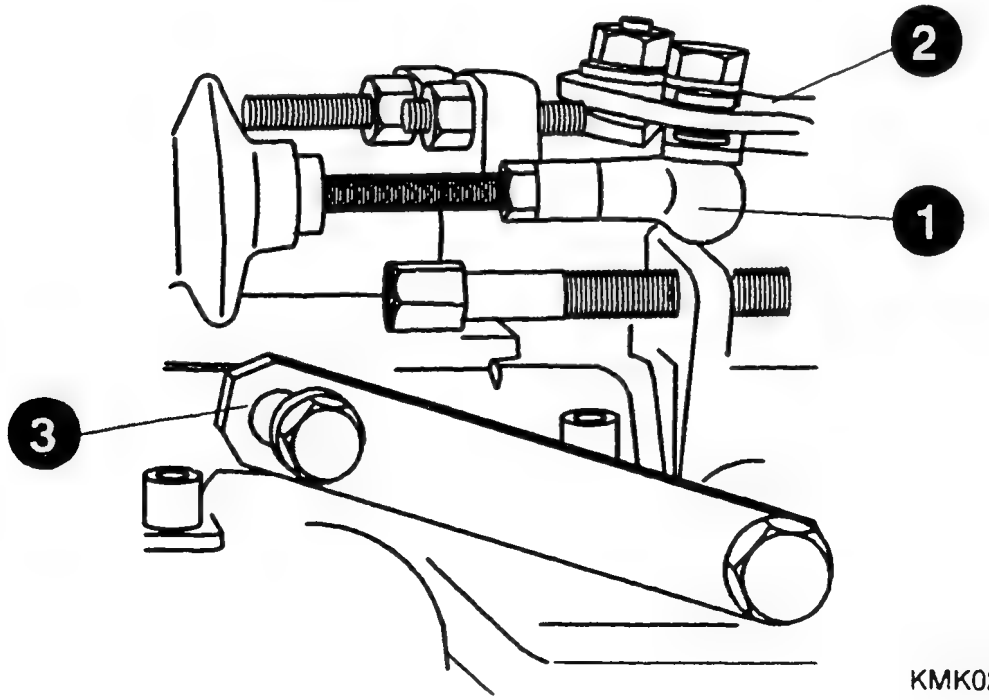
KMK02965

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Ball socket
2 = LDA basic lever
3 = Retaining bracket

Attach ball socket of LDA lifting rod to spherical bolt of LDA basic levers. Attach connecting hose from LDA pressure gauge to connection of aneroid capsule.

Continue: F19/1 Fig.: F18/2



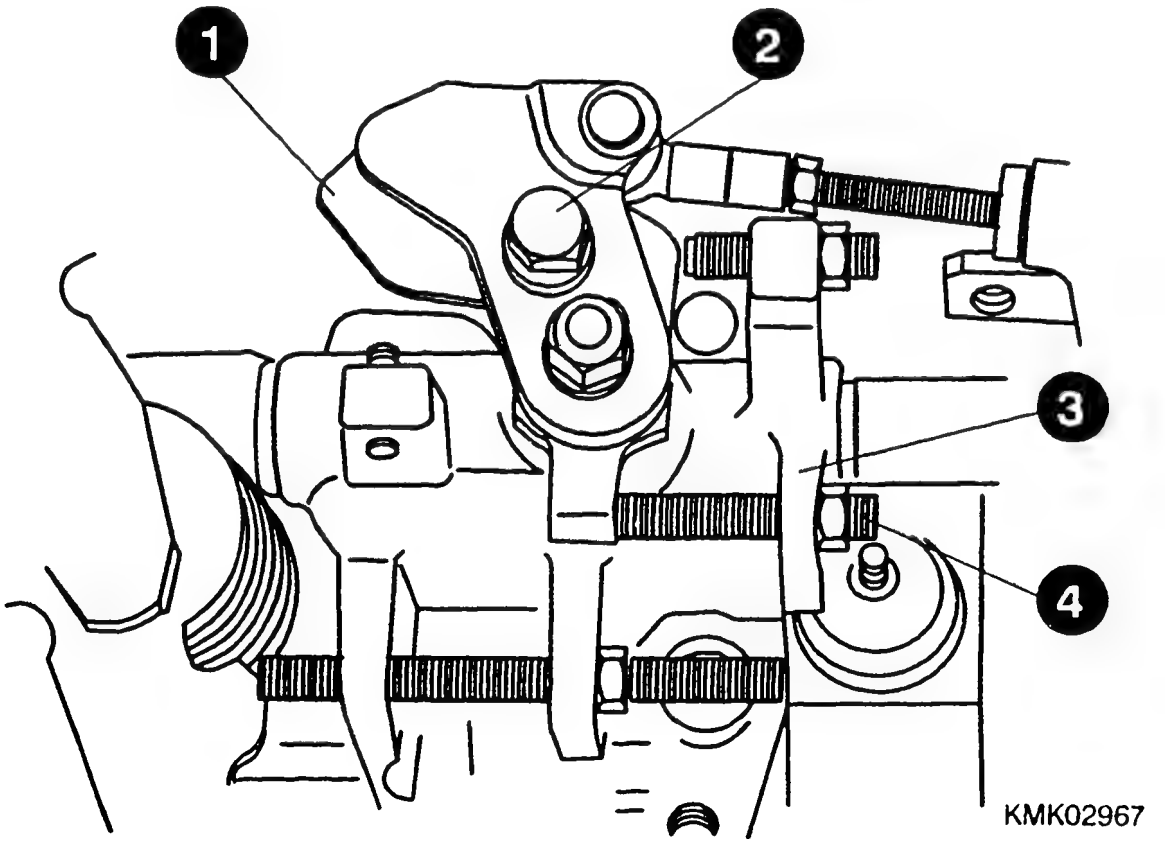
CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = LDA control lever
2 = Hexagon bolt
3 = Stop, intermediate boost pressure
4 = Adjusting screw

Loosen hexagon bolt.

Set speed as per test-specification sheet (*) and apply appropriate boost pressure to LDA.
Position LDA control lever against stop for intermediate boost pressure (arrow).
Set delivery with adjusting screw.

Continue: F20/1 Fig.: F19/2

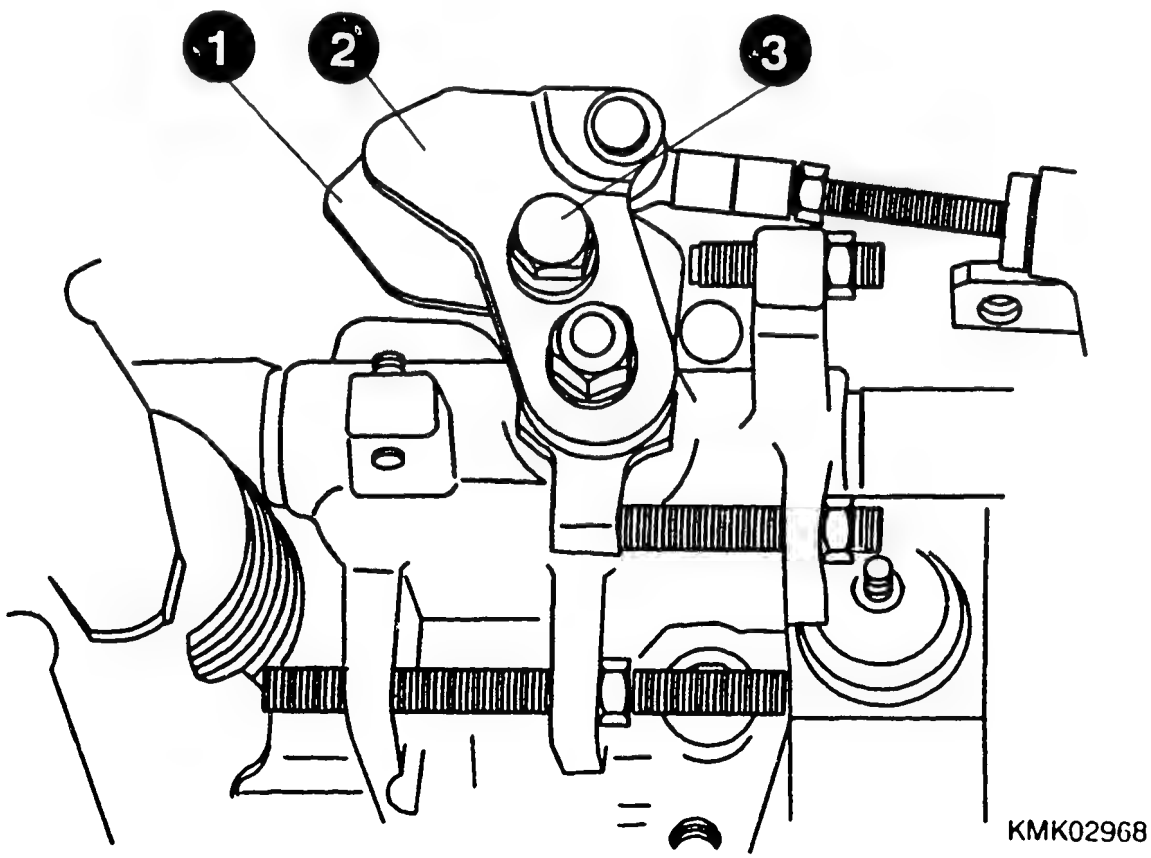


CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = LDA control lever
2 = LDA basic lever
3 = Hexagon bolt

After adjusting delivery, fix LDA control lever with basic lever by tightening hexagon bolt.

Continue: F21/1 Fig.: F20/2



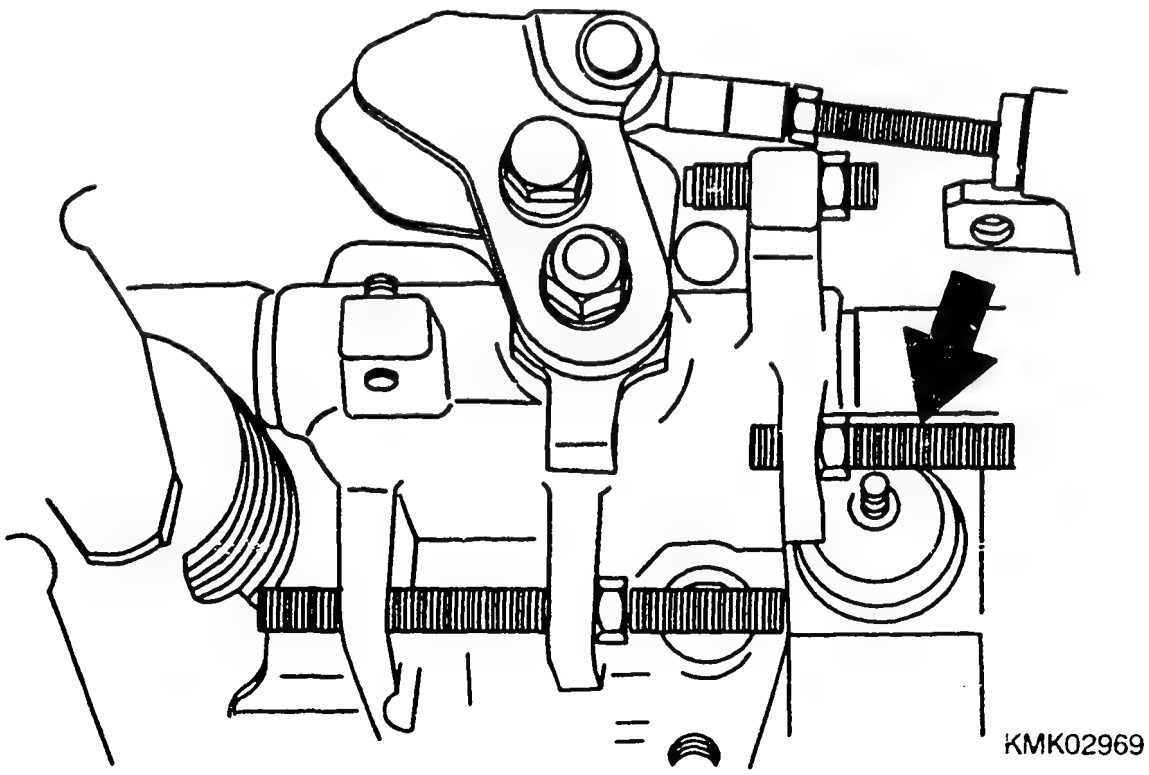
CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

Arrow = Adjusting screw

* Check setting

Turn back adjusting screw.
Interrupt boost pressure and set to stated value starting from 0 hPa.

Continue: F22/1 Fig.: F21/2



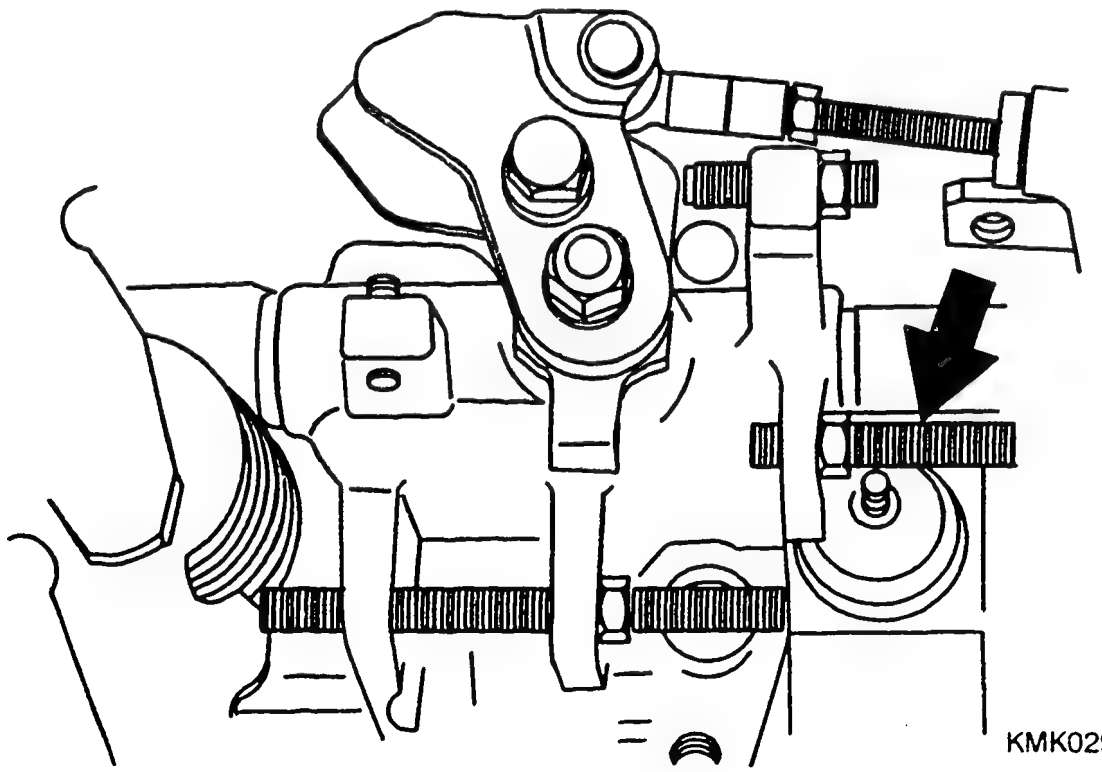
CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

Arrow = Adjusting screw

Repeat adjustment procedure if delivery indicated in test-specification sheet is not obtained.

After testing delivery, screw adjusting screw out of stop housing.

Continue: F23/1 Fig.: F22/2

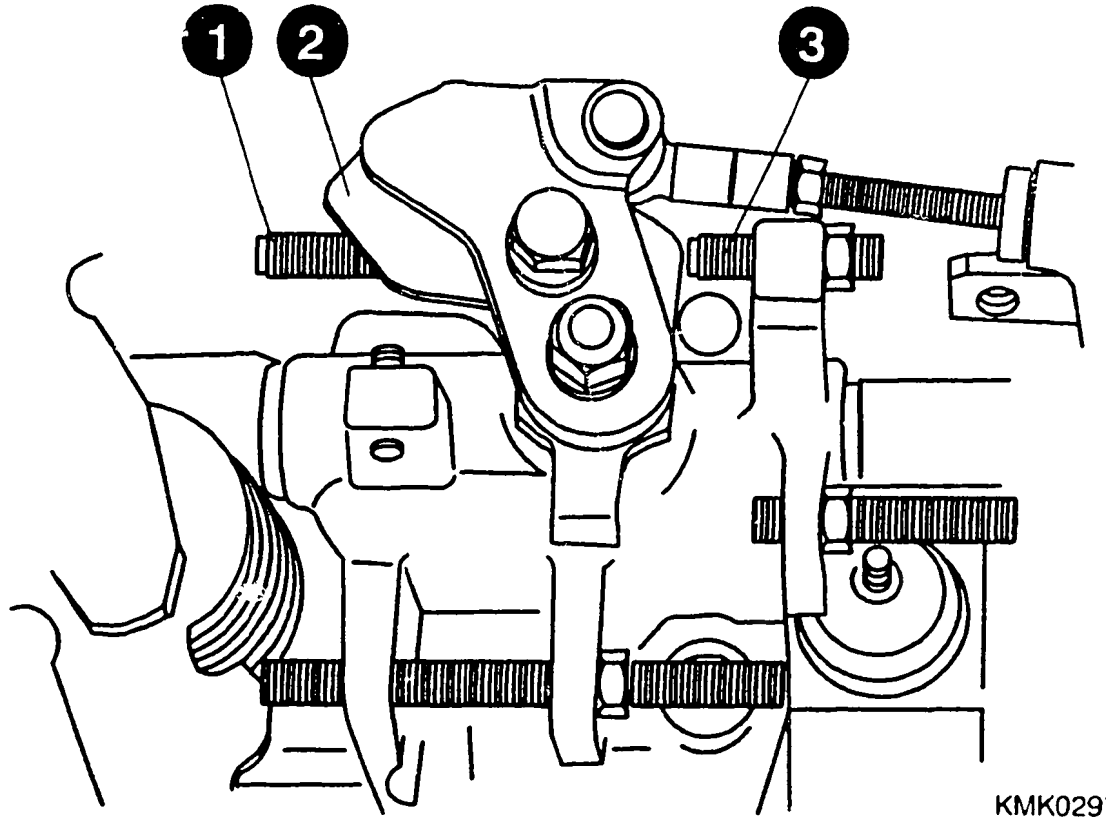


CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Idle adjusting screw
2 = LDA control lever
3 = Stop for normal delivery quantity

* Checking control lever positions
Position speed-control lever against idle adjusting screw.
Test step 1:
Apply 20...40 hPa to LDA aneroid capsule starting from 0 hPa.
The LDA control lever must still be in contact with the stop for the normal delivery quantity.

Continue: F24/1 Fig.: F23/2



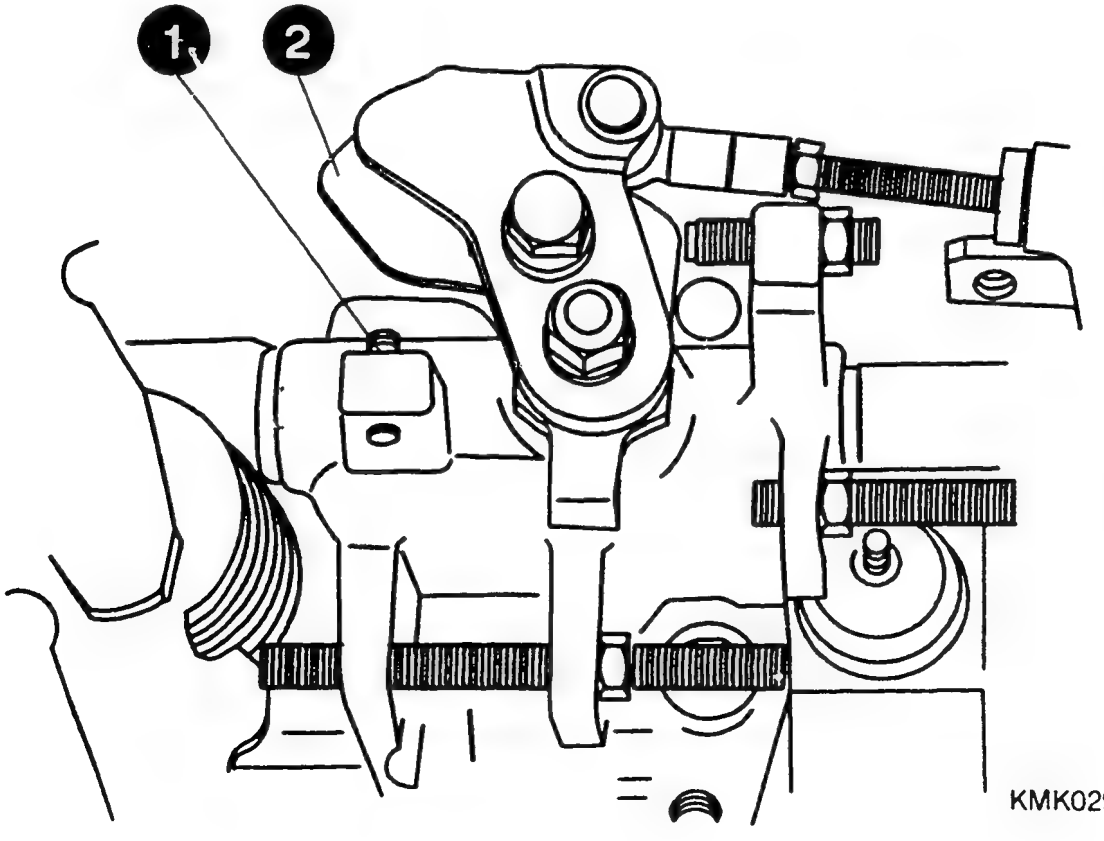
KMK02970

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Full-load boost pressure stop
2 = LDA control lever

* Check control lever positions
Test step 2:
Apply max. boost pressure as per test-specification sheet to LDA aneroid capsule.
LDA control lever must be in contact with full-load boost pressure stop.
If test steps are not satisfied, check distance between lifting rod and bushing on next Coordinate.

Continue: F25/1 Fig.: F24/2



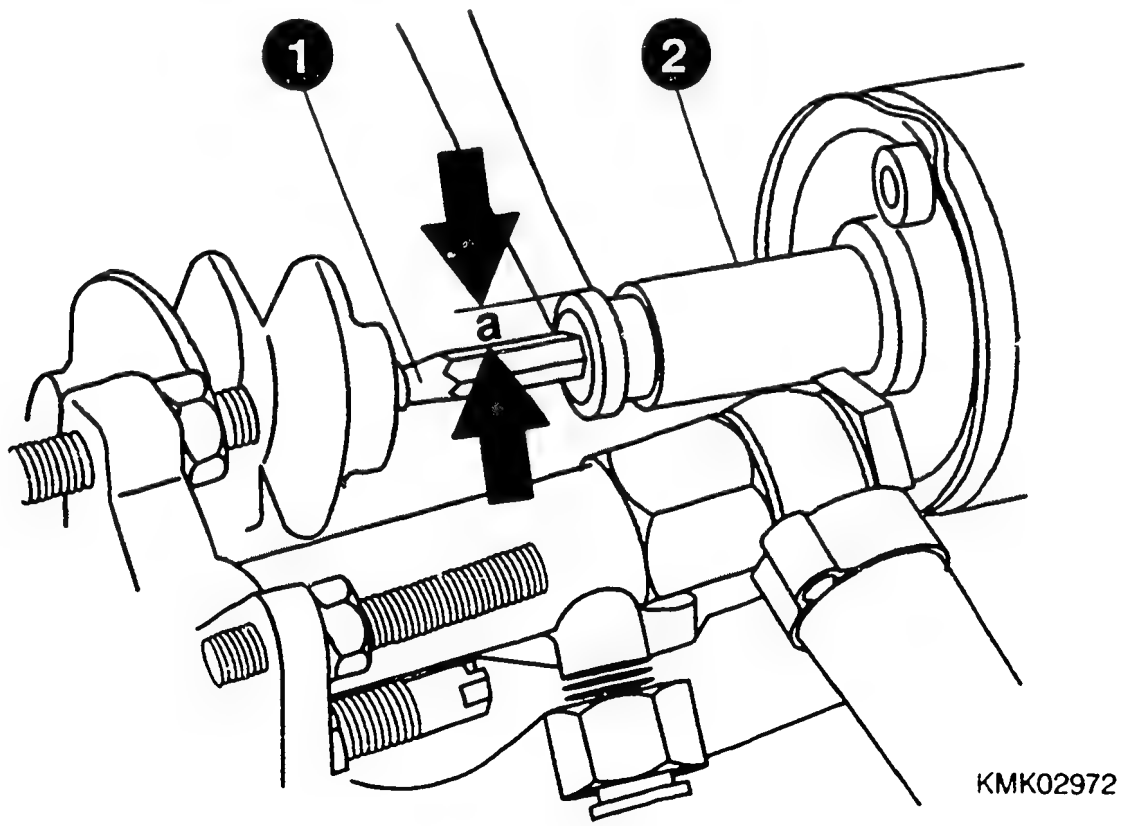
CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = Bushing
2 = LDA lifting rod

* Check distance between lifting rod and bushing

Minimum distance "a" = 0.5 mm over entire adjustment travel.
Check delivery profile.

Continue: F26/1 Fig.: F25/2

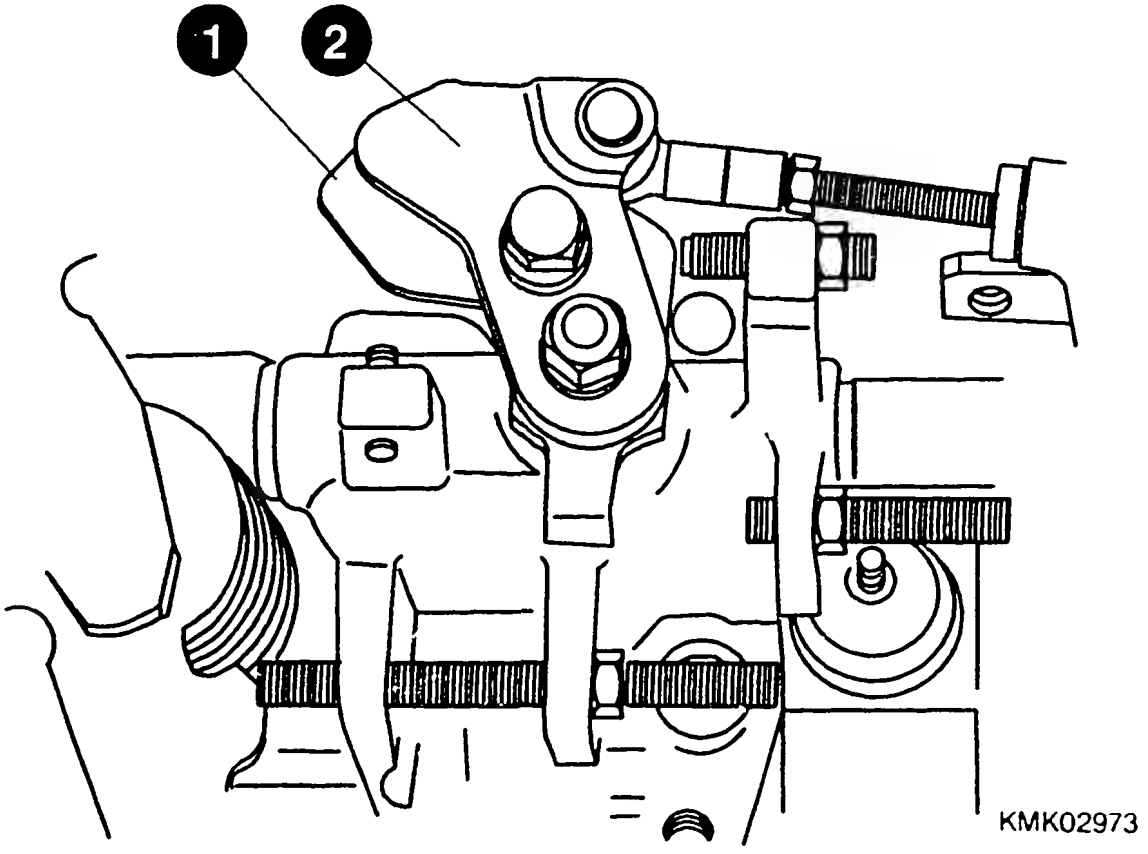


CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with external LDA

1 = LDA control lever
2 = LDA basic lever

Following adjustment, stamp control lever and basic lever with respect to one another using stamping tool KDEP 1107.

Continue: G05/1 Fig.: F26/2

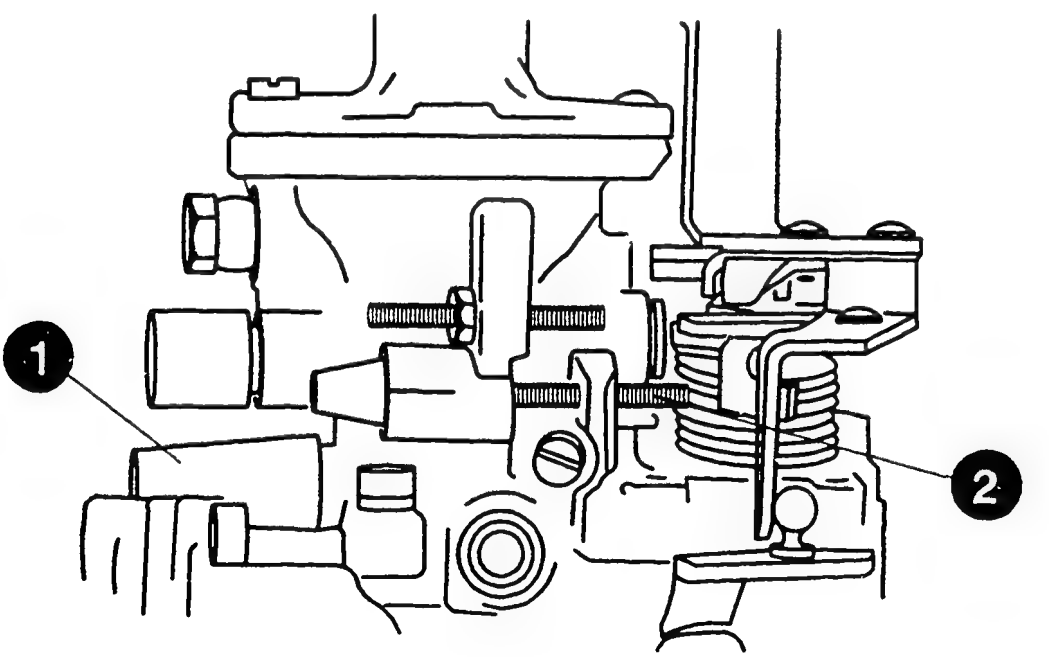


CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with HBA

1 = Anti-tamper cap, full-load adjusting screw
2 = Rated-speed adjusting screw

Position speed-control lever against rated-speed adjusting screw.
Set lower full-load speed "F" and set full-load delivery at full-load adjusting screw.
To do so, remove anti-tamper cap.
Note:
"F" indicated under delivery profile.

Continue: F28/1 Fig.: F27/2



KMK02974

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with HBA

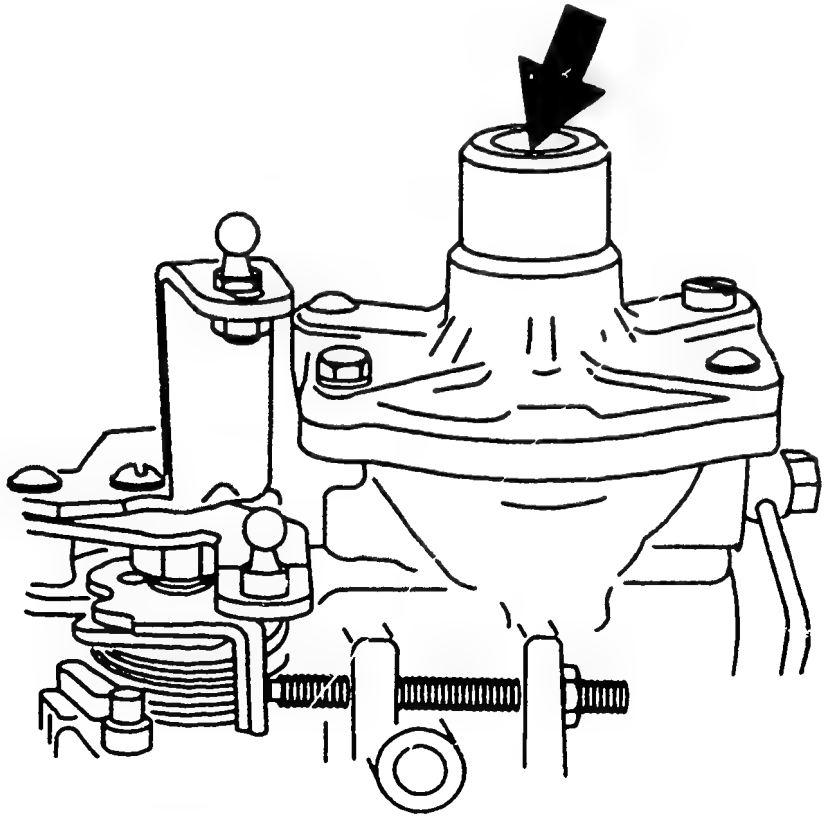
Arrow = HBA adjusting screw

Approach full-load point "E" and measure delivery.

Adjust delivery with HBA adjusting screw.

Approach upper full-load point "D" and measure delivery.
Check HBA stroke if measured delivery is insufficient.

Continue: G01/1 Fig.: F28/2



KMK02954

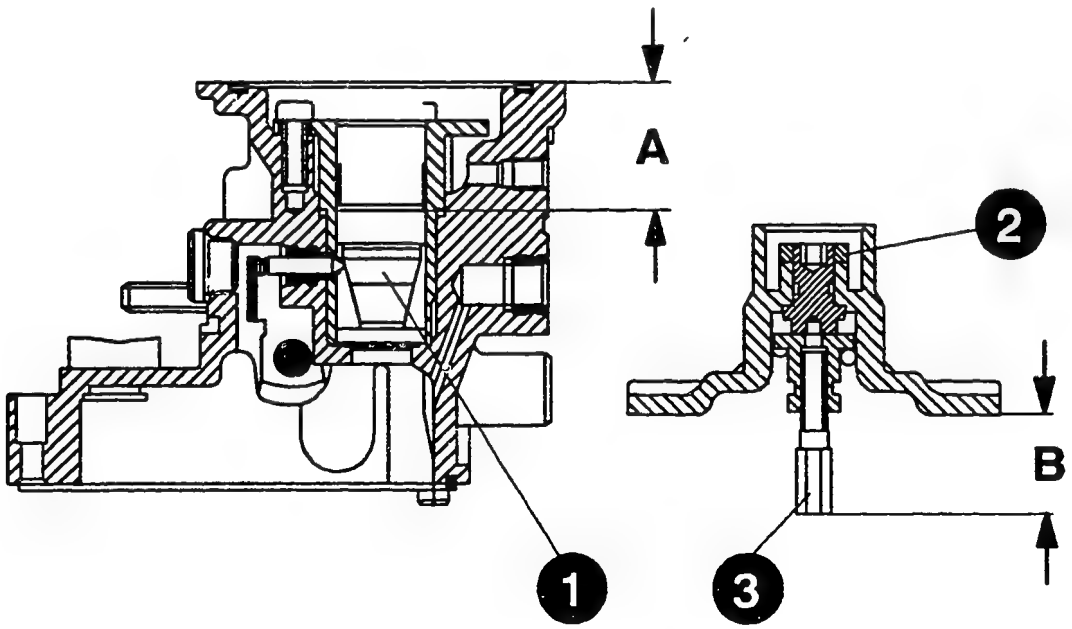
CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with HBA
- Calibrate HBA, single-taper version
Multiple taper as of Coordinate G03/1

1 = Adjusting pin
2 = Lock nut
3 = Threaded pin

Unscrew HBA cover.

Press adjusting pin downwards against stop housing.
Measure dimension "A".
Turn threaded pin until HBA stroke (as per test-specification sheet) is obtained.
HBA stroke = A – B.

Continue: G02/1 Fig.: G01/2



KMK02976

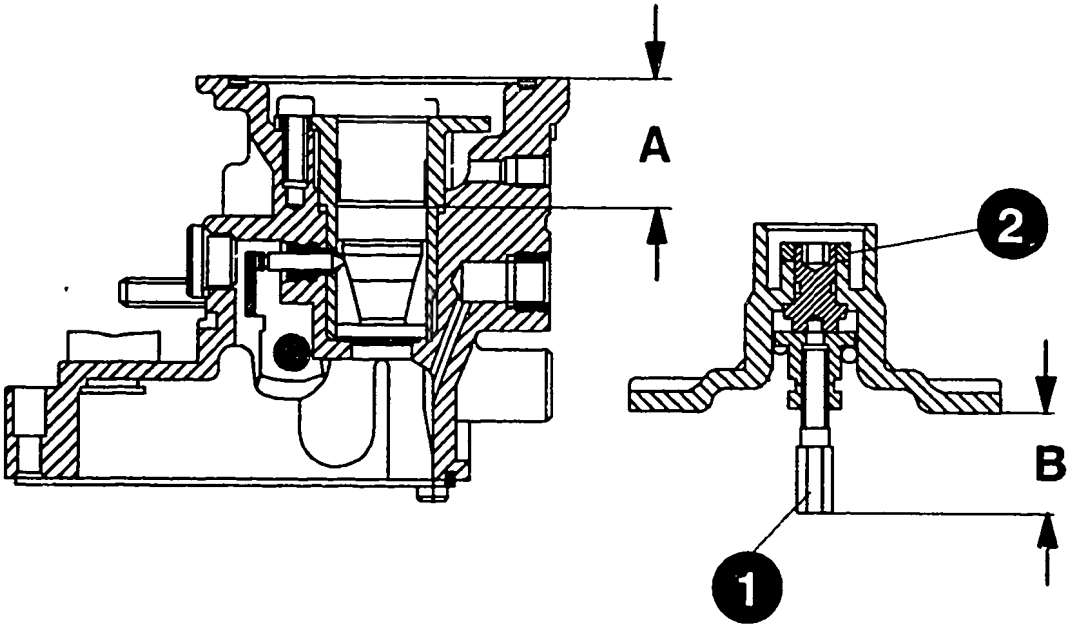
CHECKING DELIVERY AND BREAKAWAY PROFILE
 * Pump with HBA
– Calibrate HBA, single-taper version

1 = Threaded pin
2 = Lock nut

Tighten threaded pin with lock nut in this position.
Tightening torque 3...5 Nm
Install HBA cover.
Tightening torque for cover fastening screws 5...8 Nm.

Re-check delivery profile.

Continue: G05/1 Fig.: G02/2



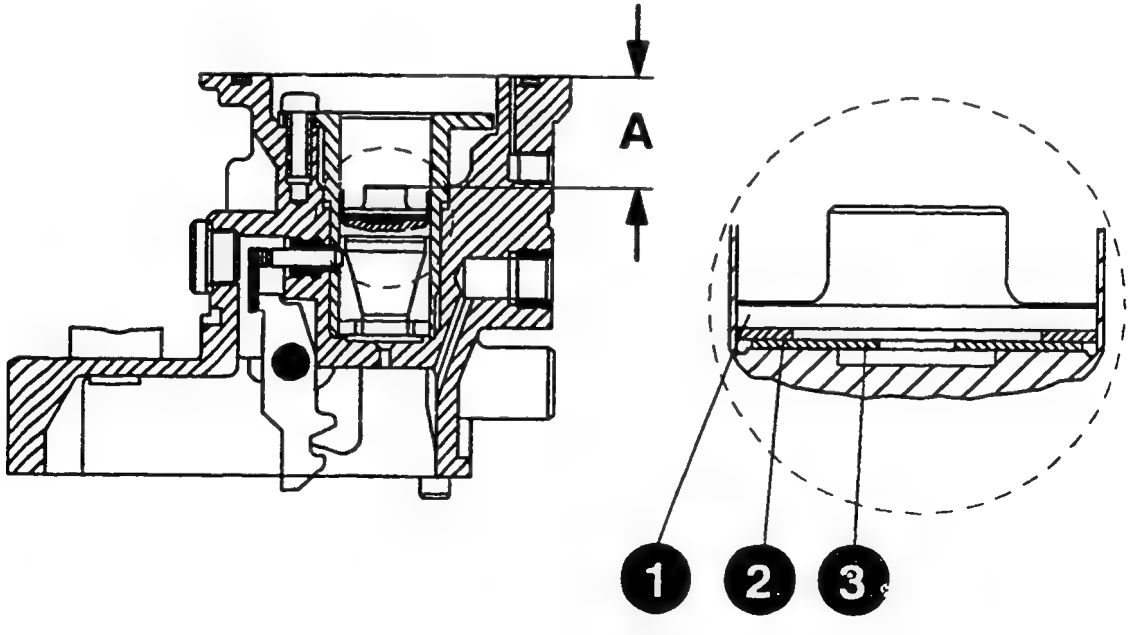
KMK02977

CHECKING DELIVERY AND BREAKAWAY PROFILE
* Pump with HBA
– HBA calibration – version:
Multiple taper

1 = Lobe washer
2 = Shim
3 = Shim

Unscrew HBA cover.
Press down HBA piston.
Press stop housing.
Measure dimension "A" as far as
contact with lobe washer and note down.

Continue: G04/1 Fig.: G03/2



KMK02978

CHECKING DELIVERY AND BREAKAWAY PROFILE

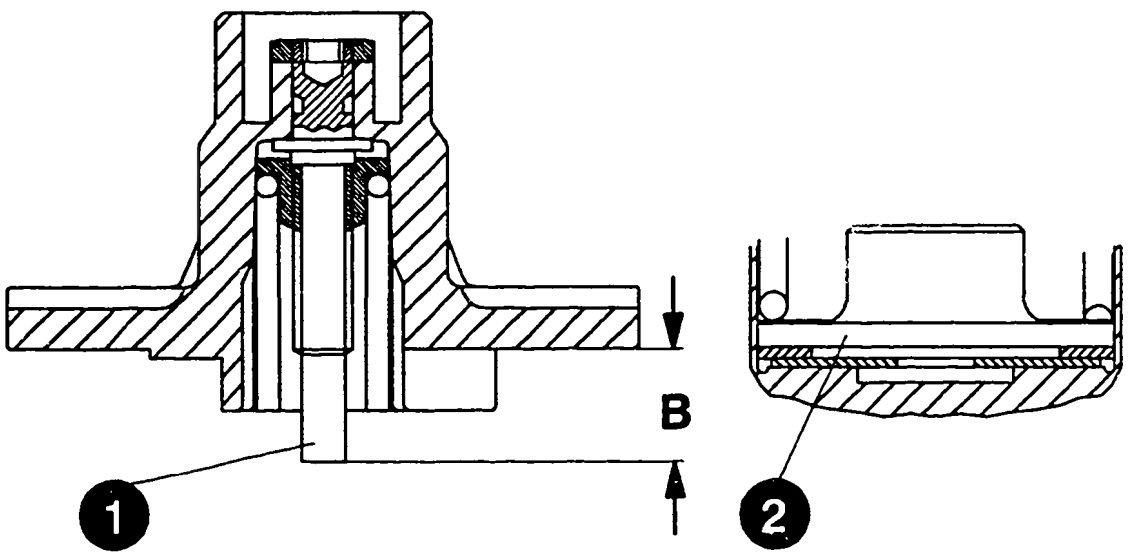
* Pump with HBA

– HBA calibration – version:
Multiple taper

1 = Threaded pin
2 = Lobe washer

Measure dimension "B" – distance between threaded pin and HBA cover.
HBA stroke = A – B.
If HBA stroke as per test-specification sheet is not obtained, adjust HBA stroke by way of shims beneath lobe washer.
Fit HBA cover.
Re-check delivery profile.

Continue: G05/1 Fig.: G04/2



KMK02979

CHECKING ZERO DELIVERY (STOP)

Select adjustment in accordance with following additional functions:

Electr. shut-off device
Coordinate G05/2

Mechanical shut-off device
Coordinate G06/1

Continue: G05/2

CHECKING ZERO DELIVERY (STOP)

Electr. shut-off device:

Position control lever at idle stop screw.
Set pump speed.
Apply prescribed voltage to shutoff solenoid.
Zero delivery must be attained.
Renew shutoff solenoid if zero delivery is not attained.

Continue: G06/1

CHECKING ZERO DELIVERY (STOP)

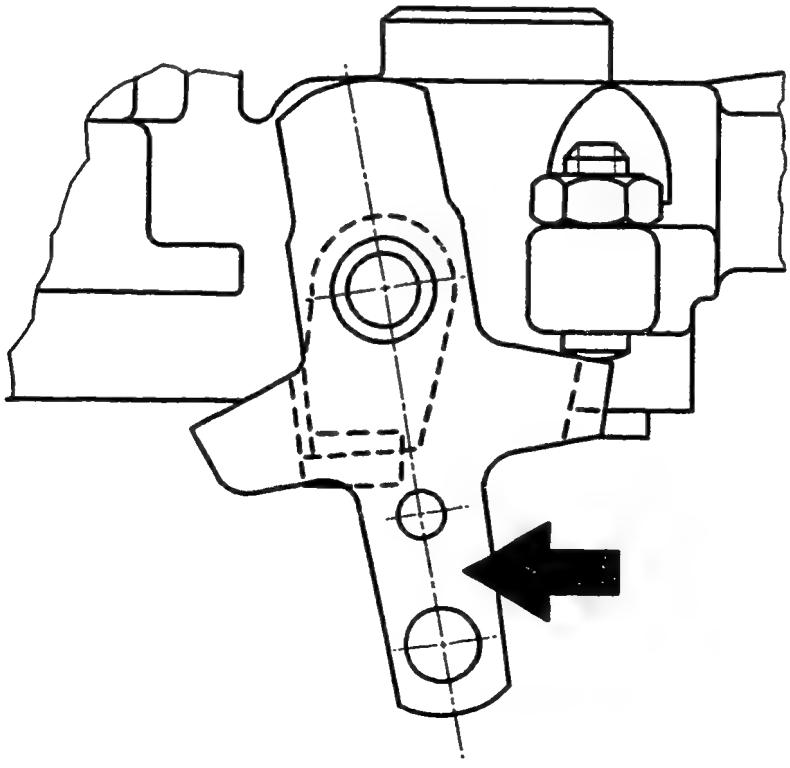
Arrow = Stop lever

Mechanical shut-off device:

Set pump speed.
Press stop lever; zero delivery must be attained.

Check stop lever and regulating lever installation positions if zero delivery is not attained.

Continue: G07/1 Fig.: G06/2



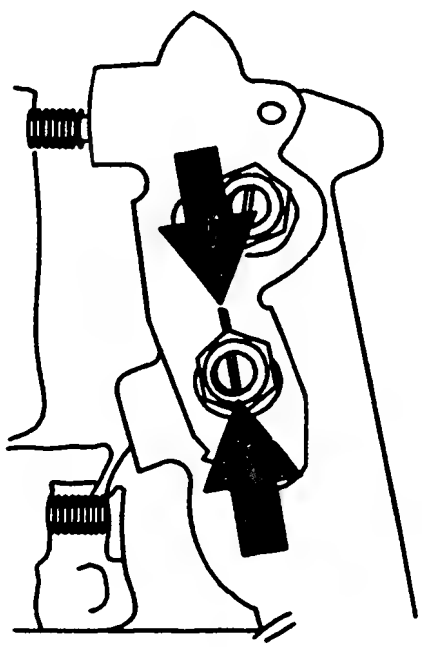
KMK02355

ADJUSTING STOP/REGULATING LEVER

Mark control lever and shaft with respect to one another (arrows).
Remove fastening screws for distributor-pump cover.
Raise cover and press shaft inwards.

Adjustment of the various shut-off devices is governed by the shape of the stop/regulating lever.
Refer to next Coordinate for distinguishing feature.

Continue: G08/1 Fig.: G07/2



KMK02289

ADJUSTING STOP/REGULATING LEVER

The distinguishing feature of the various shut-off devices is the shape of the stop/regulating lever.

Select stop-lever variants as illustrated:

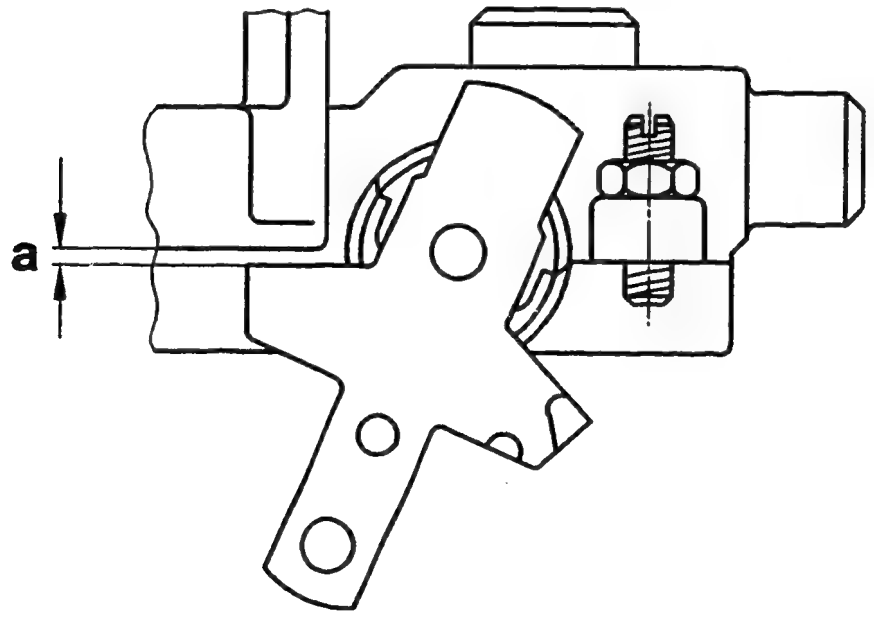
	Coordinate
* Standard version Stop-lever stop, left	G09/1
* Standard version Stop-lever stop, right	G10/1
* Special version A	G11/1
* Special version B	G12/1
* Negative torque control	G13/1

Continue: G09/1

ADJUSTING STOP/REGULATING LEVER

Stop lever, left
Standard version

Continue: G14/1 Fig.: G09/2

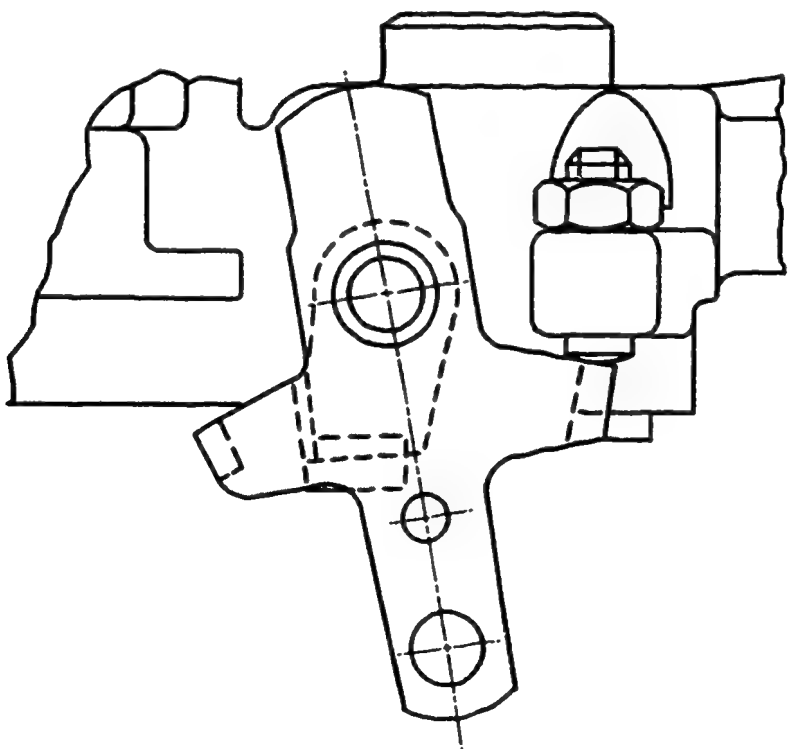


KMK02290

ADJUSTING STOP/REGULATING LEVER

Stop lever, right
Standard version

Continue: G16/1 Fig.: G10/2

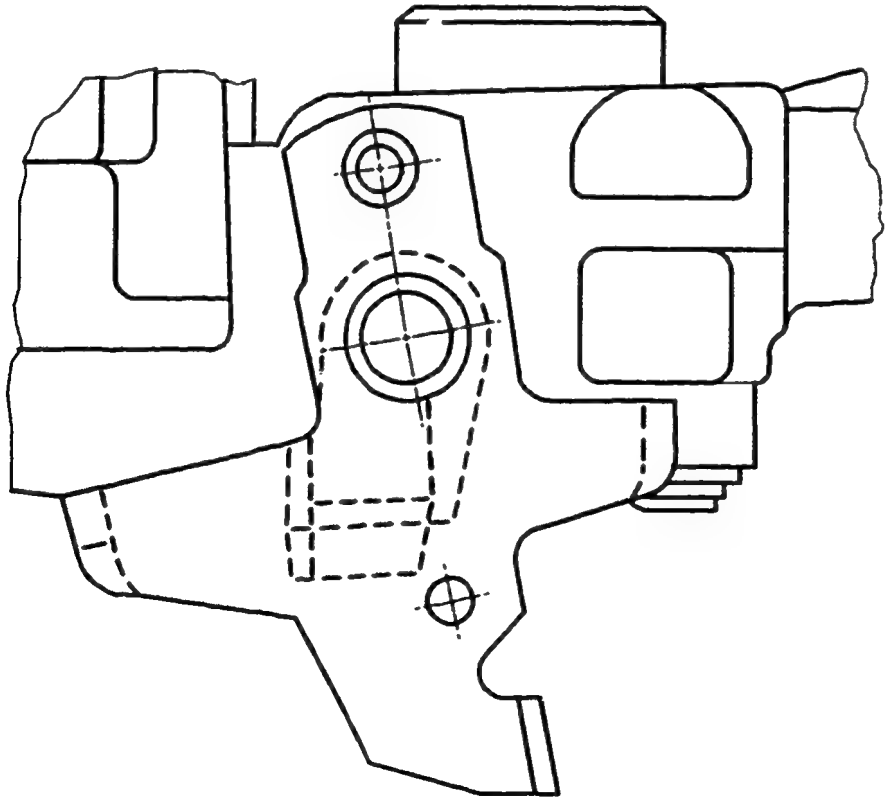


KMK02291

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Special version A:

Continue: G20/1 Fig.: G19/2

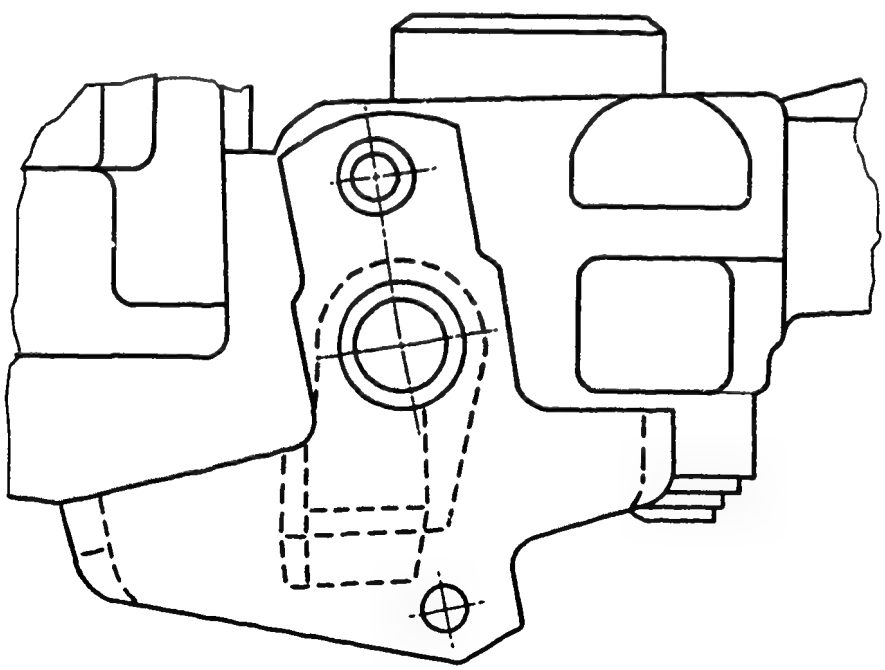


KMK02292

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Special version B

Continue: G23/1 Fig.: G12/2

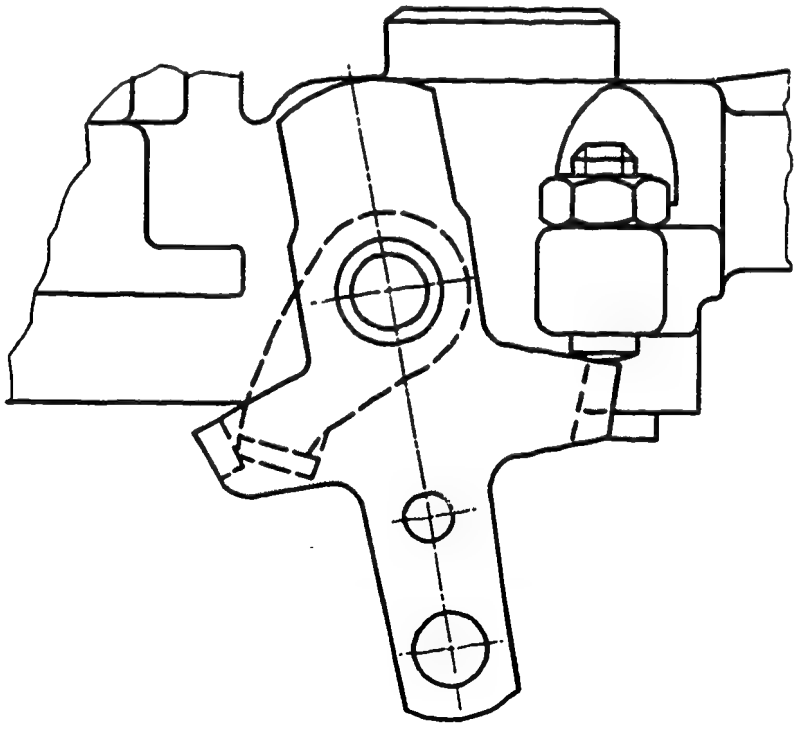


KMK02293

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Negative torque control

Continue: G26/1 Fig.: G13/2



KMK02294

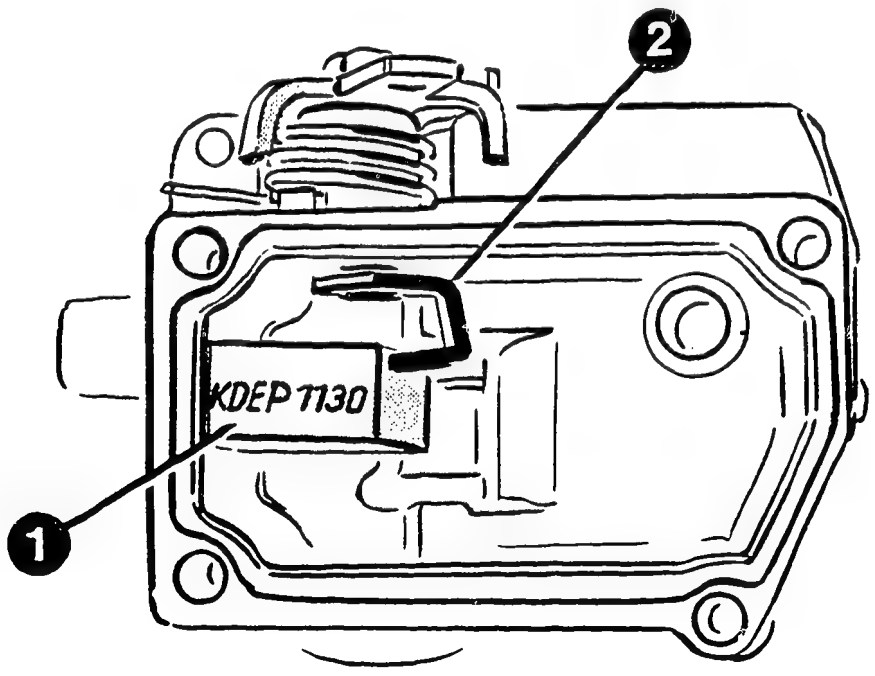
ADJUSTING STOP/REGULATING LEVER

* Stop lever, left, standard version

1 = Spacer KDEP 1130
2 = Regulating lever

Position spacer KDEP 1130 between inside edge of housing cover and regulating lever.

Continue: G15/1 Fig.: G14/2



KMK 02295

ADJUSTING STOP/REGULATING LEVER

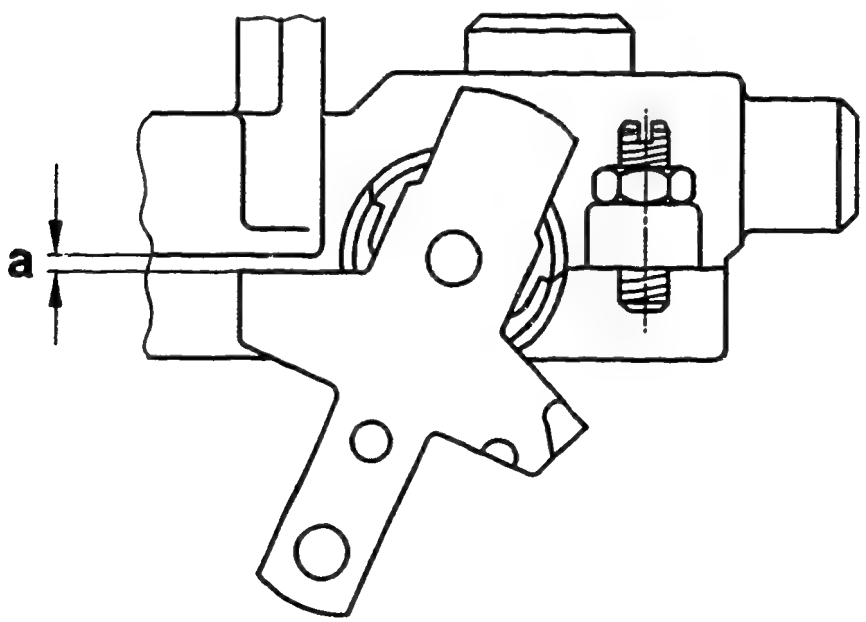
* Stop lever, left, standard version

Position stop lever on setting shaft.

There must be a gap "a" = 2...5 mm between stop lever and housing in this position.

If not, alter stop lever.

Continue: H02/1 Fig.: G15/2



KMK02290

ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

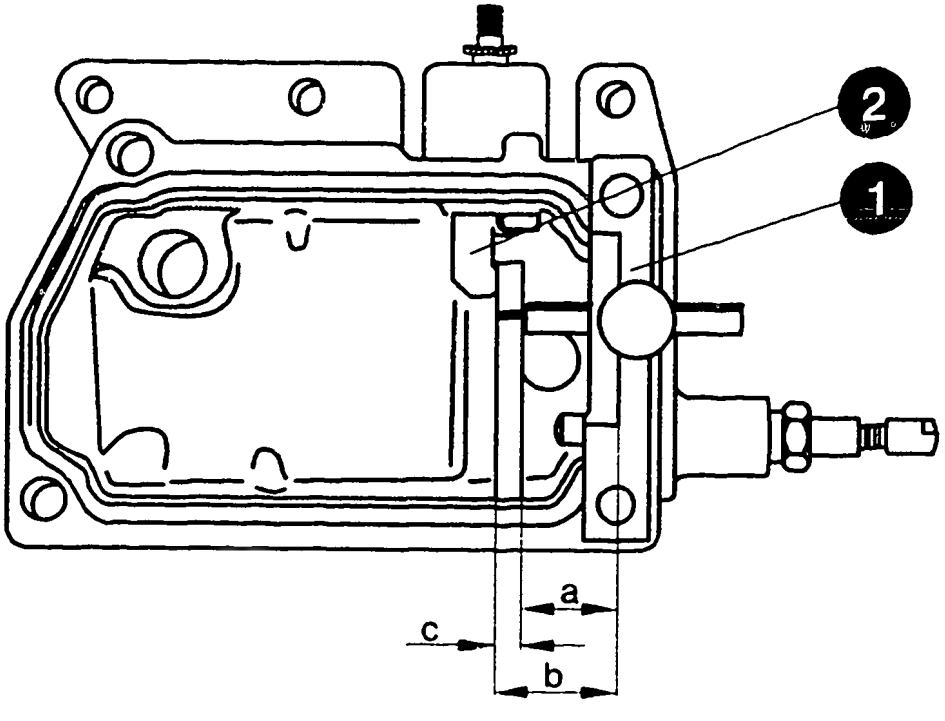
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a=b-c) and adjust measurement arm to this dimension.

Dimension "b"= 19.3 mm

Continue: G17/1 Fig.: G16/2



KMK02296

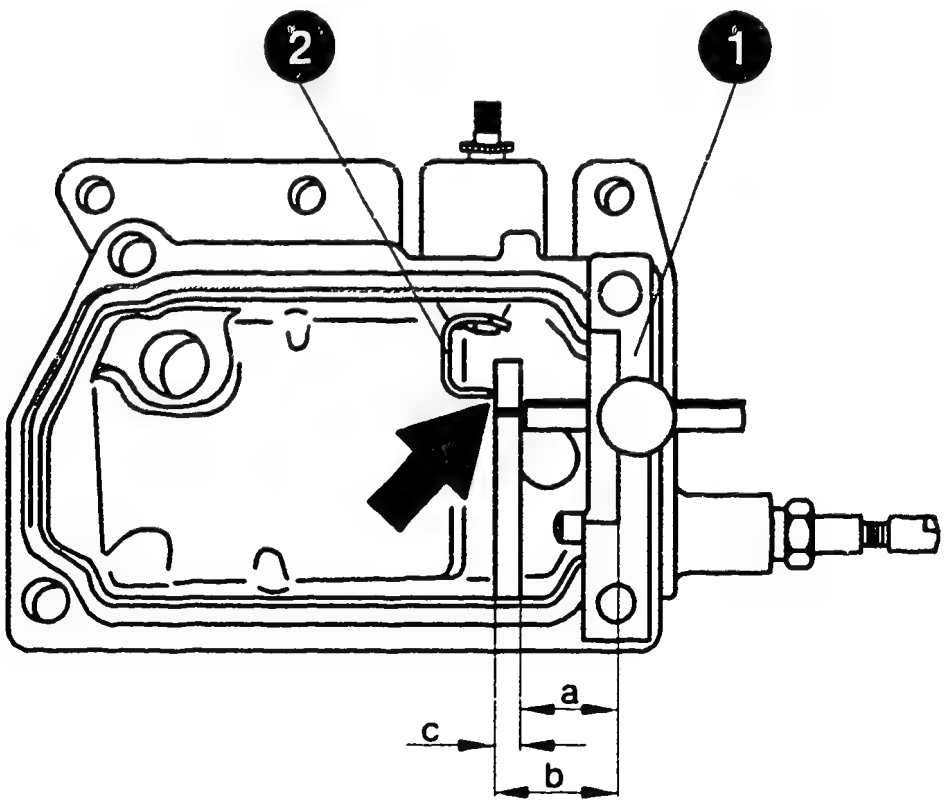
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow). Regulating lever must be in contact with measurement arm KDEP 1152/3 for subsequent operations.

Continue: G18/1 Fig.: G17/2



KMK02297

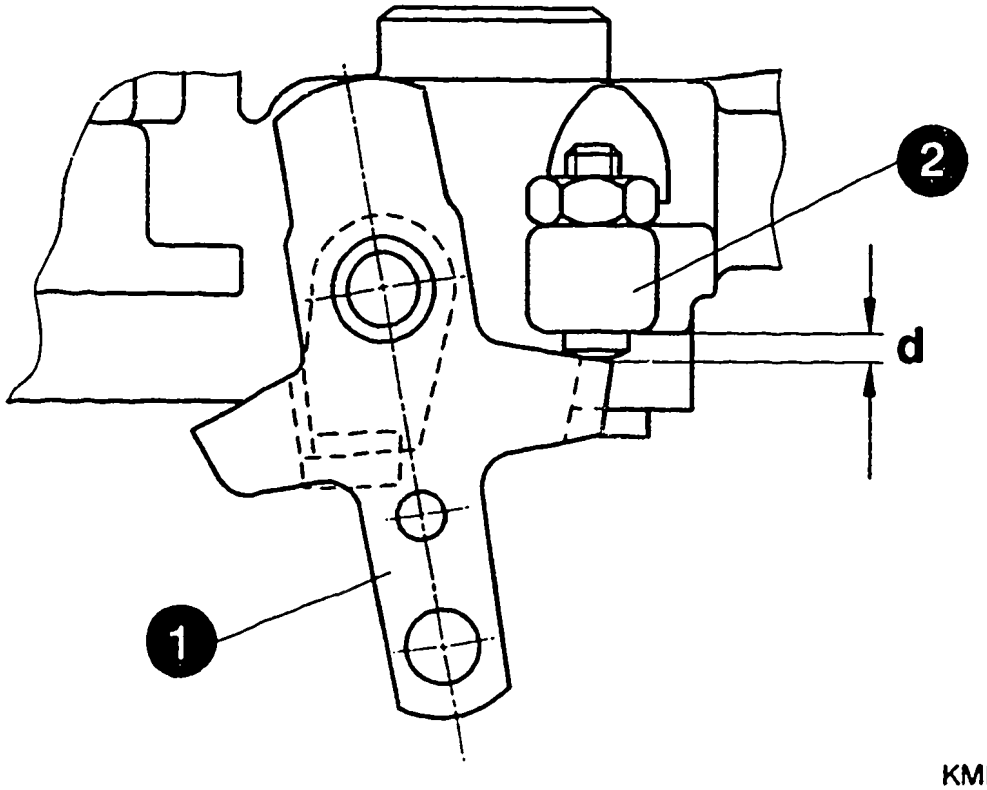
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Stop lever
2 = Housing stop

Position stop lever on setting-shaft toothing such that dimension "d" between lever and housing stop is as small as possible.
Engage spring.
Press stop lever in direction of housing stop and, at the same time, tighten hexagon nut on setting shaft.
Tightening torque 5...10 Nm.

Continue: G19/1 Fig.: G18/2



KMK02298

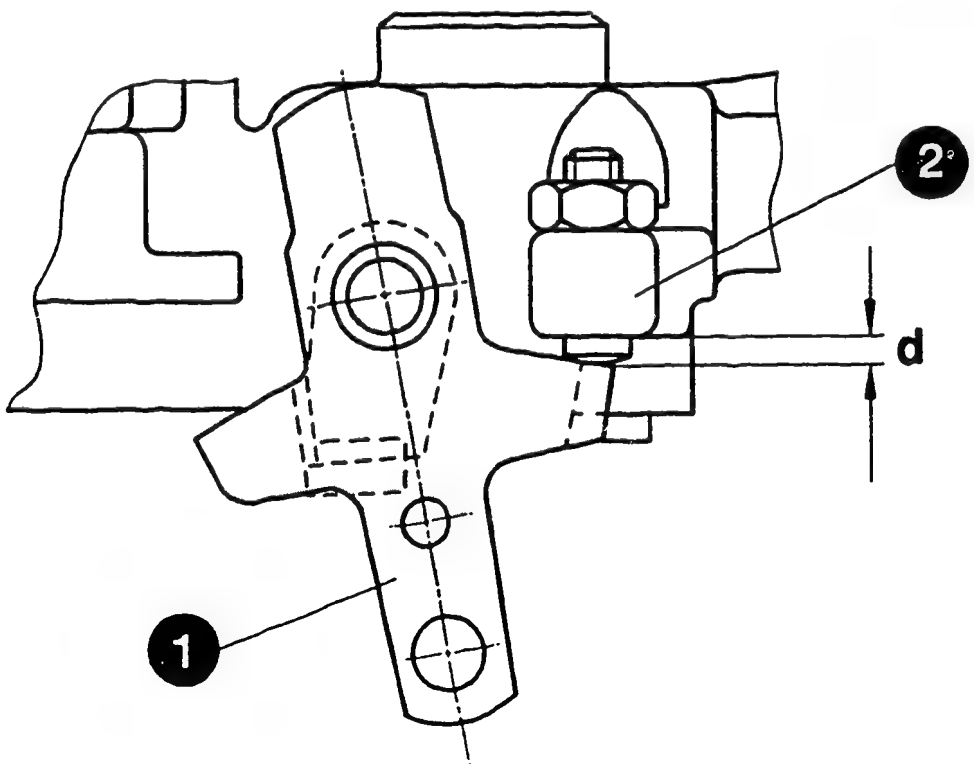
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Stop lever
2 = Stop screw

Close stop screw on stop lever (dimension "d") and tighten lock nut to tightening torque of 6...9 Nm.

Continue: H02/1 Fig.: G19/2



KMK02298

ADJUSTING STOP/REGULATING LEVER

* Special version A

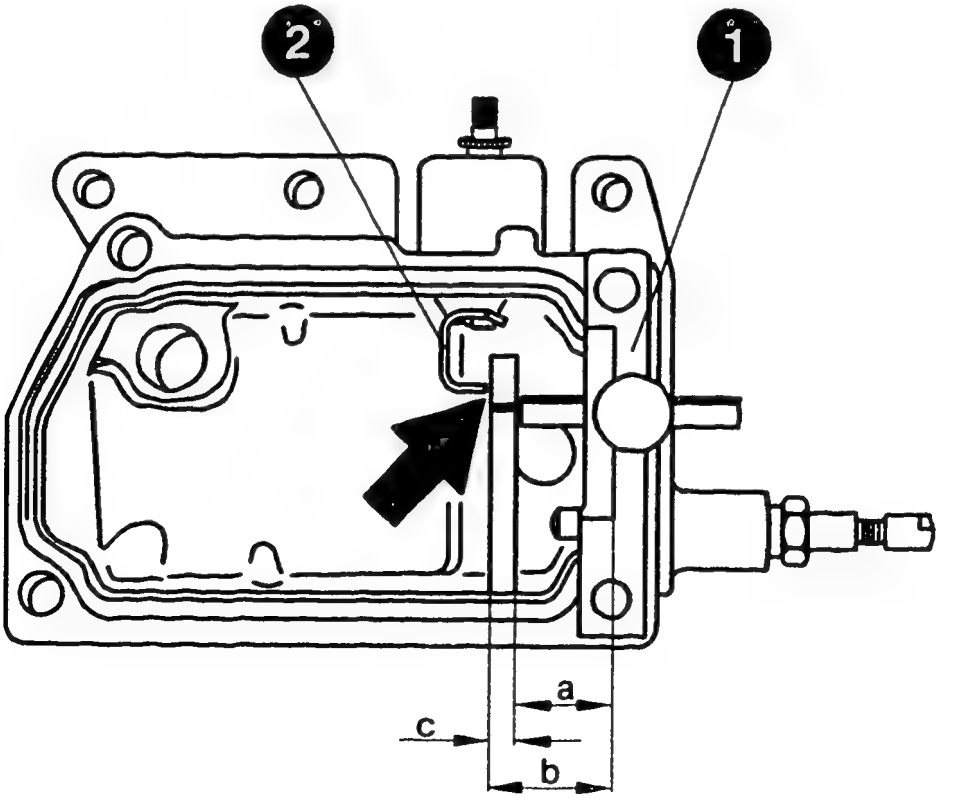
1 = Measurement tool
2 = Regulating lever

Position KDEP 1152/3 on housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b – c) and set measurement arm to this dimension.

Dimension "b"= 20.3 mm

Continue: G21/1 Fig.: G20/2



KMK02297

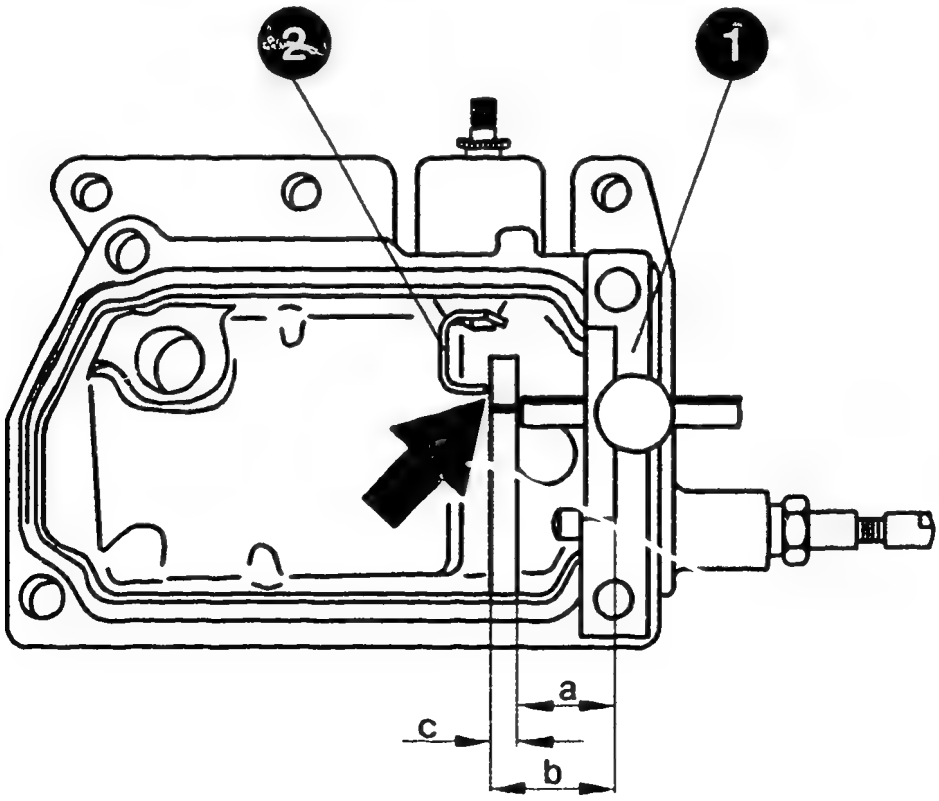
ADJUSTING STOP/REGULATING LEVER

* Special version A

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: G22/1 Fig.: G21/2



KMK02297

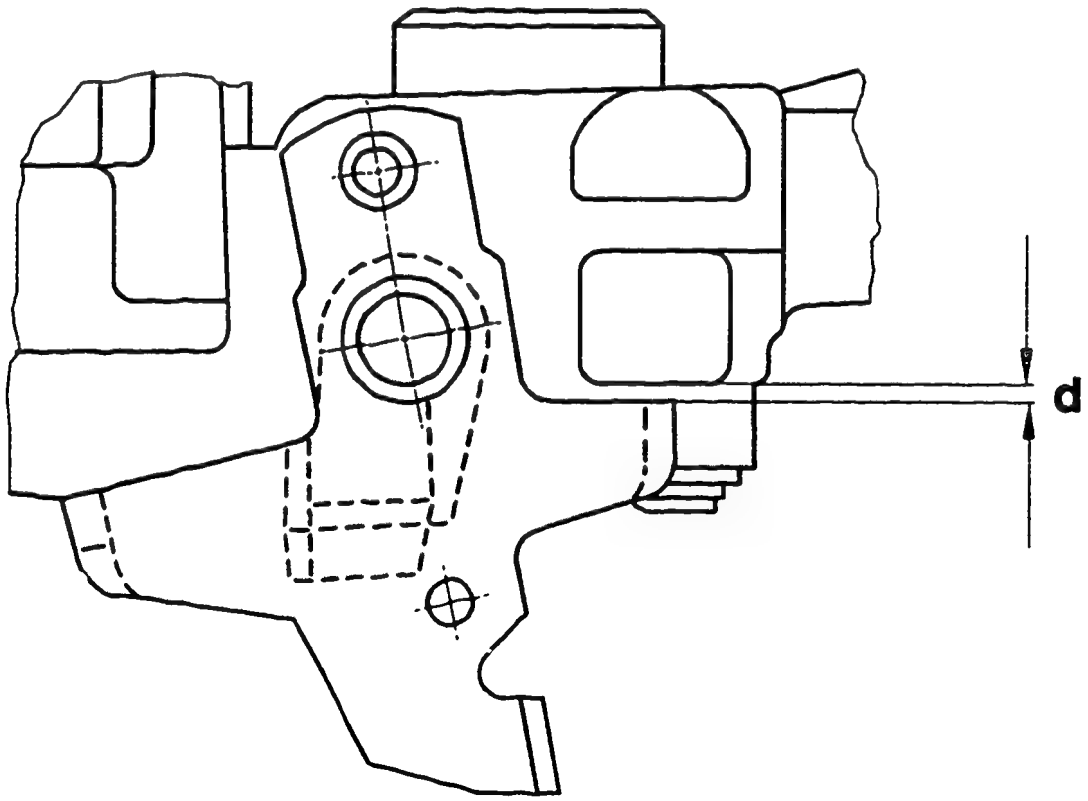
ADJUSTING STOP/REGULATING LEVER

* Special version A

Position stop lever on setting shaft such that dimension "d" between lever and housing stop is max. 2.0 mm.

Should dimension not be attained, slightly reduce dimension "b" = 20.3 mm.
Engage spring.
Press lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft to tightening torque of 5...10 Nm.

Continue: H02/1 Fig.: G22/2



KMK02299

ADJUSTING STOP/REGULATING LEVER

* Special version B

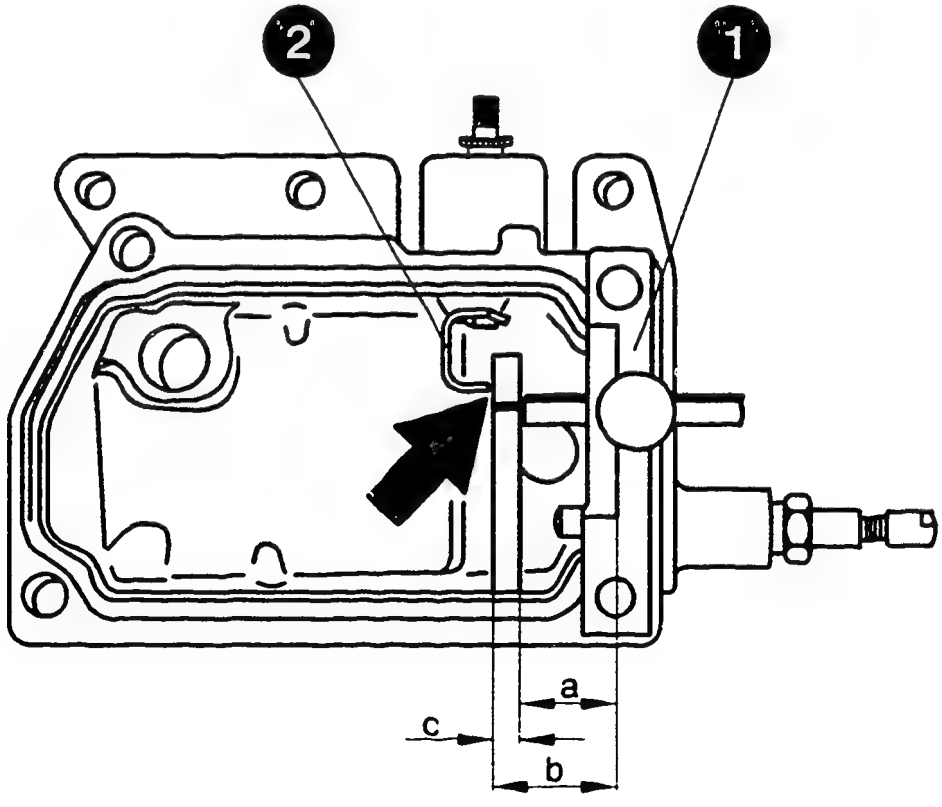
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b - c) and set measurement arm to this dimension.

Dimension "b" = 20.3 mm

Continue: G24/1 Fig.: G23/2



KMK02297

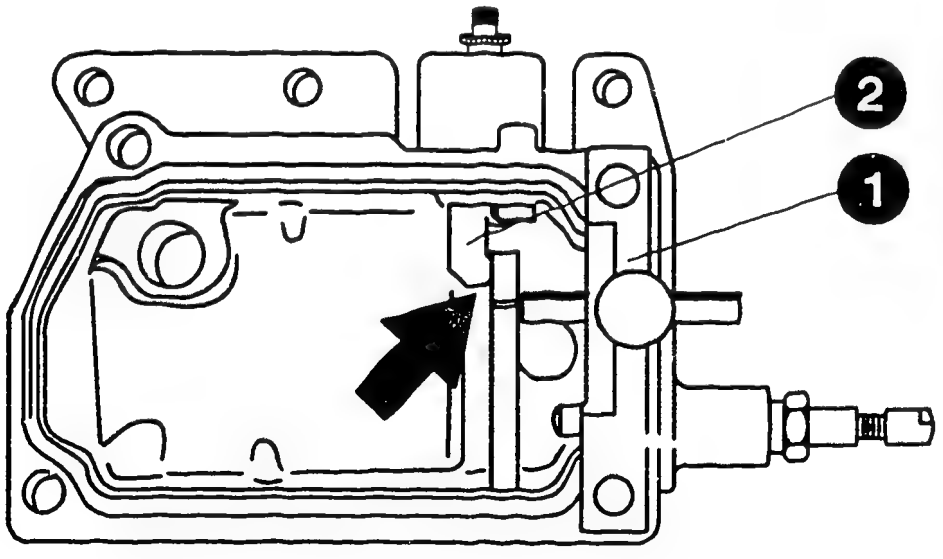
ADJUSTING STOP/REGULATING LEVER

* Special version B

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: G25/1 Fig.: G24/2



KMK02300

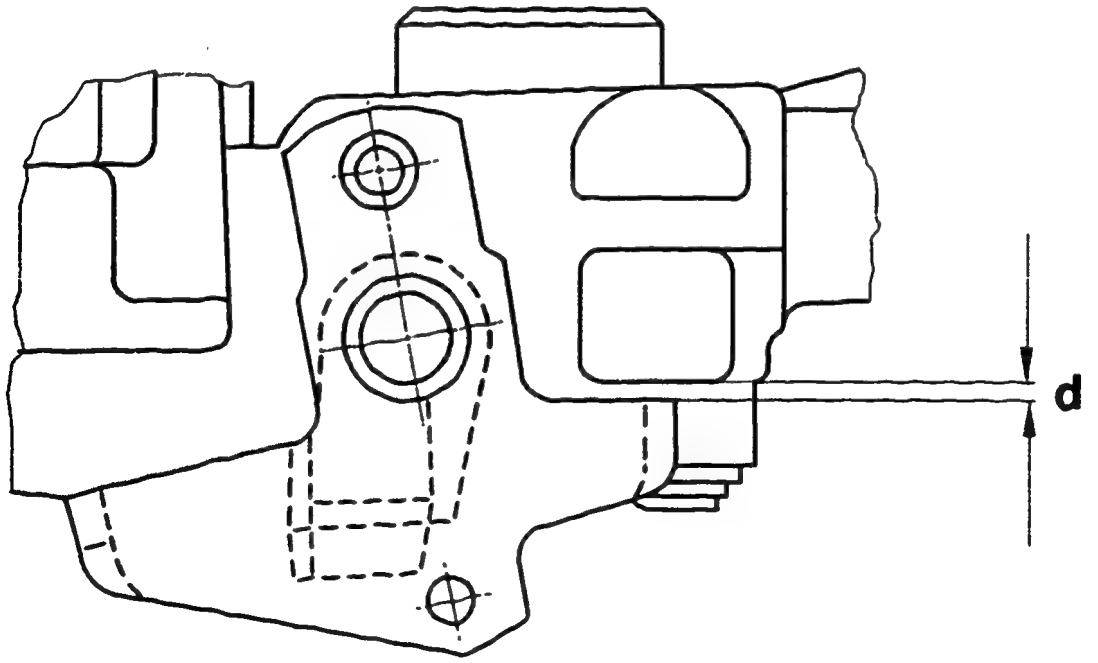
ADJUSTING STOP/REGULATING LEVER

* Special version B

Position stop lever on setting shaft such tht dimension "d" between lever and housing stop is max. 2.0 mm.

If dimension is not attained, slightly reduce dimension "b" = 20.3 mm.
Engage spring.
Press lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft to tightening torque of 5...10 Nm.

Continue: H02/1 Fig.: G25/2



KMK02301

ADJUSTING STOP/REGULATING LEVER

* With negative torque control

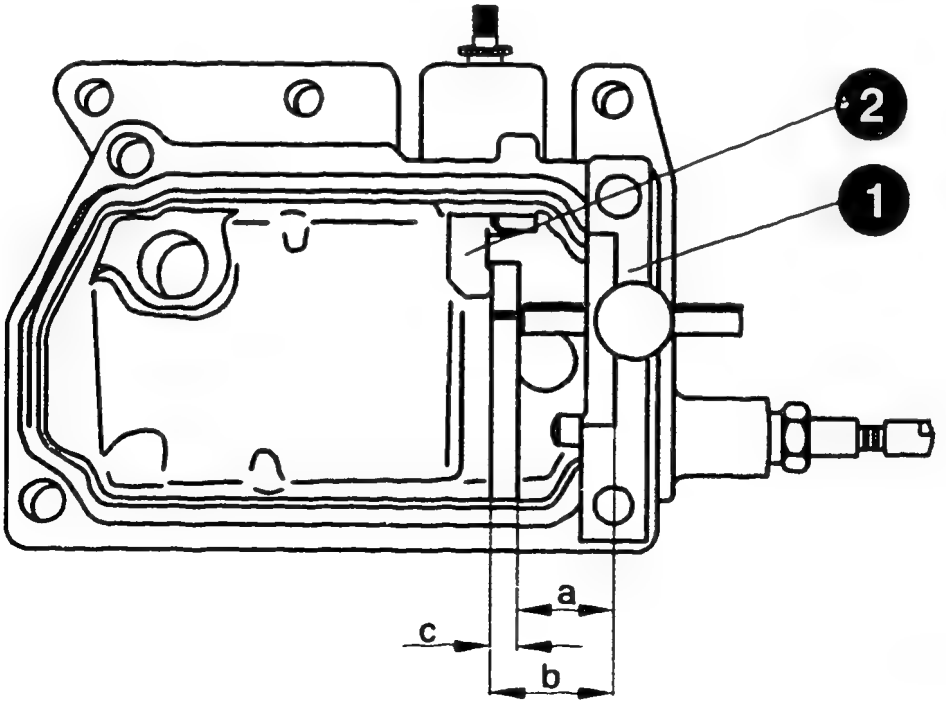
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b - c) and adjust measurement arm to this dimension.

Dimension "b" = 28.8 mm

Continue: G27/1 Fig.: G26/2



KMK02296

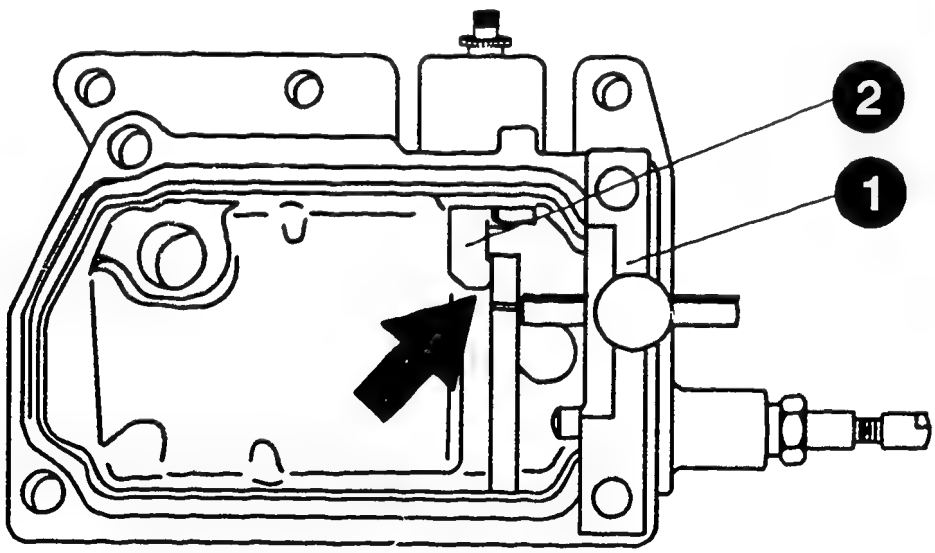
ADJUSTING STOP/REGULATING LEVER

* With negative torque control

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: G28/1 Fig.: G27/2



KMK02300

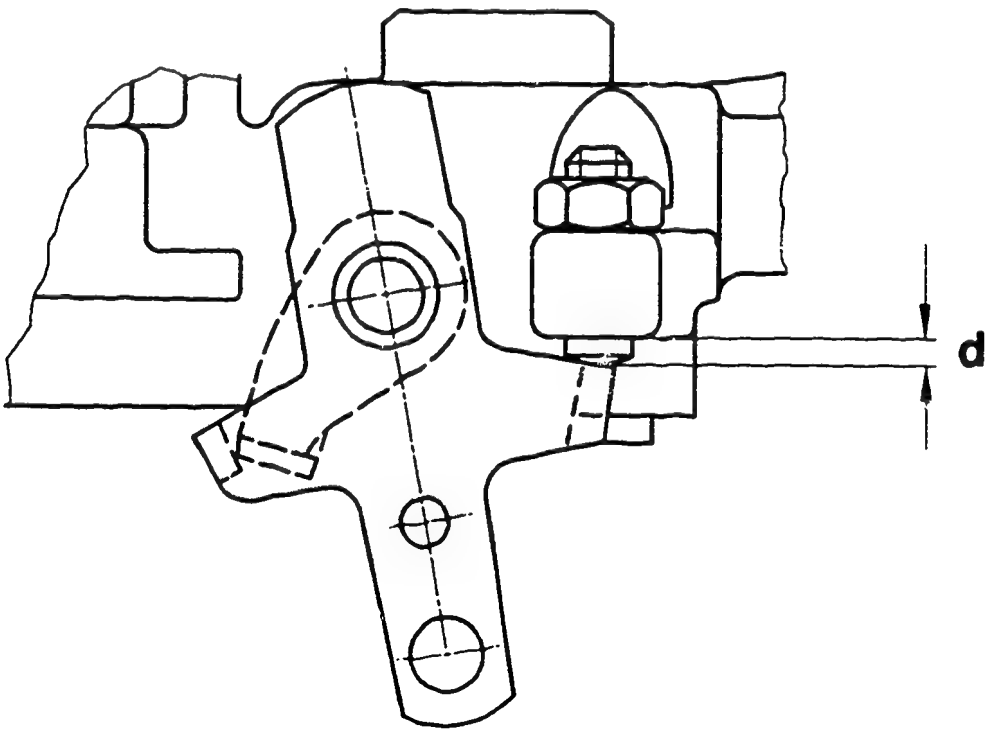
ADJUSTING STOP/REGULATING LEVER

* With negative torque control

Position stop lever on setting-shaft toothing such that dimension "d" between lever and housing stop is as small as possible.

Engage spring.
Press stop lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft.
Tightening torque 5...10 Nm.

Continue: H01/1 Fig.: G28/2



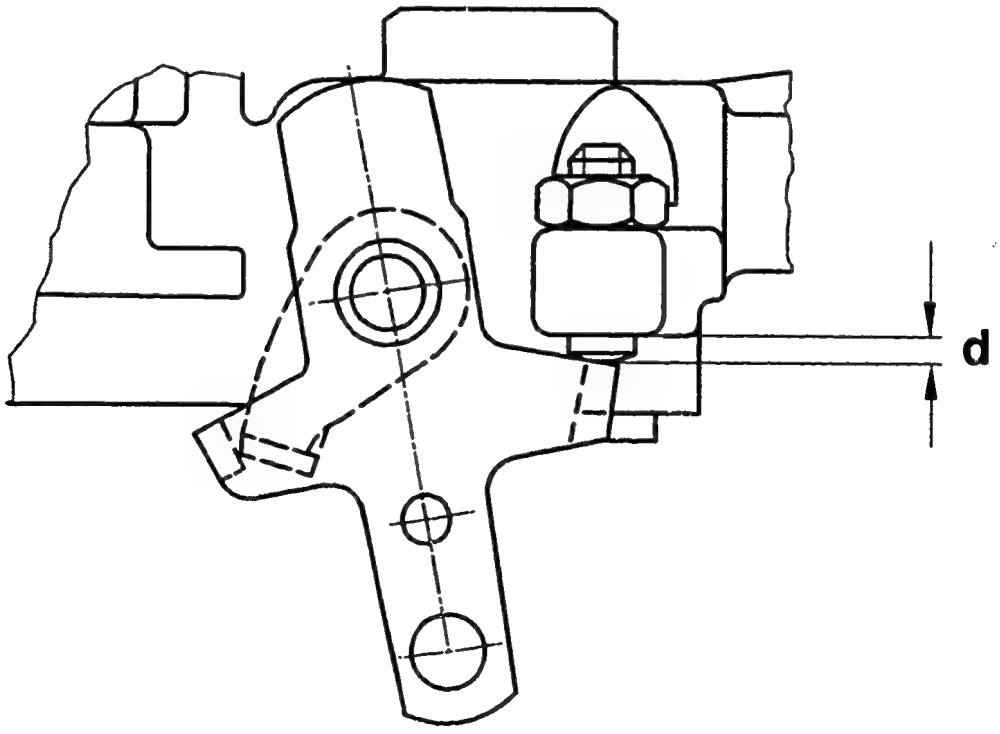
KMK02302

ADJUSTING STOP/REGULATING LEVER

* With negative torque control

Close stop screw on stop lever (dimension "d") and tighten lock nut to tightening torque of 6...9 Nm.

Continue: H02/1 Fig.: H01/2



KMK02302

MEASURING STARTING FUEL DELIVERY

Move control lever from idle stop to rated-speed stop.
Note:
In the event of deviation e.g. position control lever at idle stop, indication is given under Remarks in test-specification sheet.
Measure starting fuel delivery.

Continue: H02/2

MEASURING STARTING FUEL DELIVERY

If starting fuel delivery is not attained, check sleeve-starting travel "MS dimension" in accordance with Section "Calibration work".
For calibration work refer to
Coordinate H11/2

If necessary, increase MS dimension (indication on test-specification sheet).
If starting fuel delivery is attained, check idle and full-load speed regulation.

Work through other causes as per repair instructions.

Continue: H03/1

FITTING FULL-LOAD STOP

Select assembly in accordance with following types of sealing:

Lead seal with sleeve
Coordinate H04

Lead seal with plastic caps
Coordinate H06

Continue: H04/1

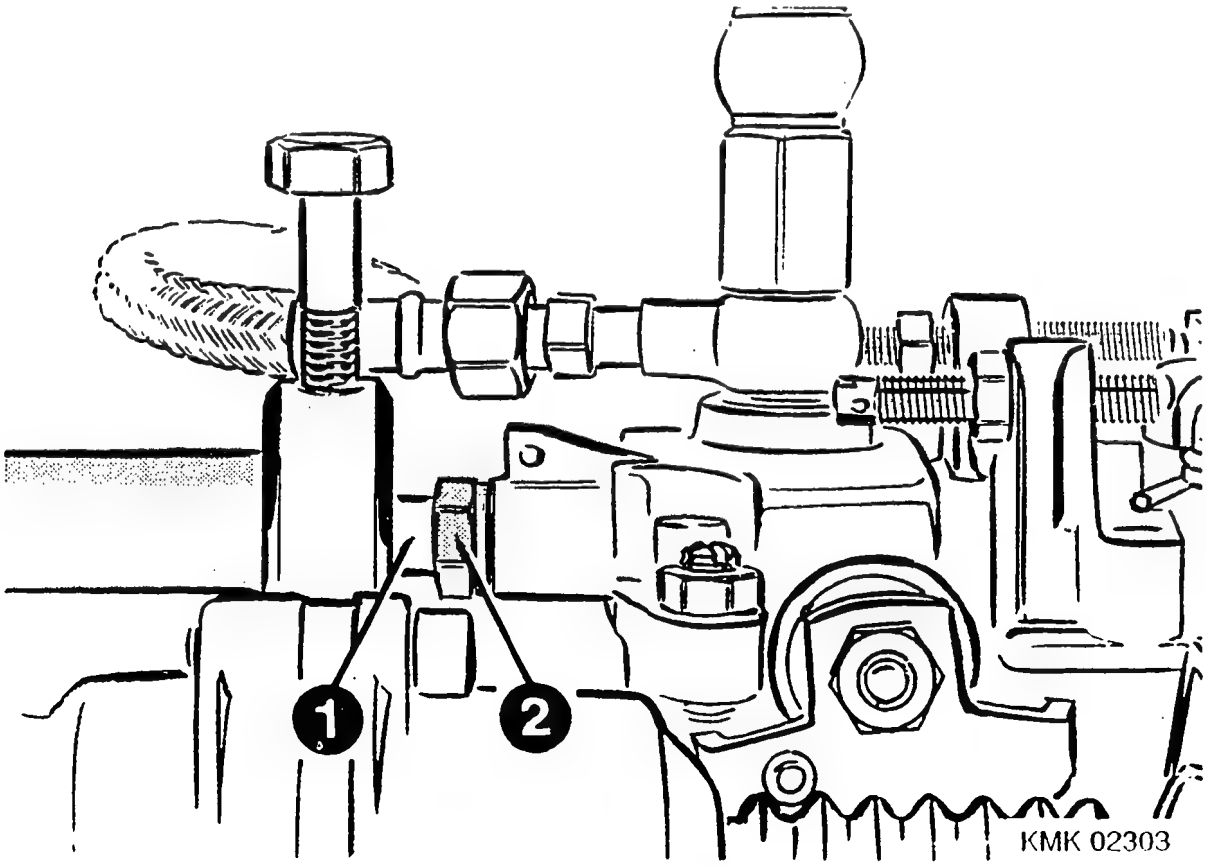
FITTING FULL-LOAD STOP
* Locking-sleeve version

1 = Locking sleeve
2 = Hexagon nut

Slip new locking sleeve (for locking full-load screw) onto threaded pin until it makes contact with hexagon nut.

Guide stamping tool KDEP 1106 over threaded pin and locking sleeve until it makes contact with hexagon nut.

Continue: H05/1 Fig.: H04/2

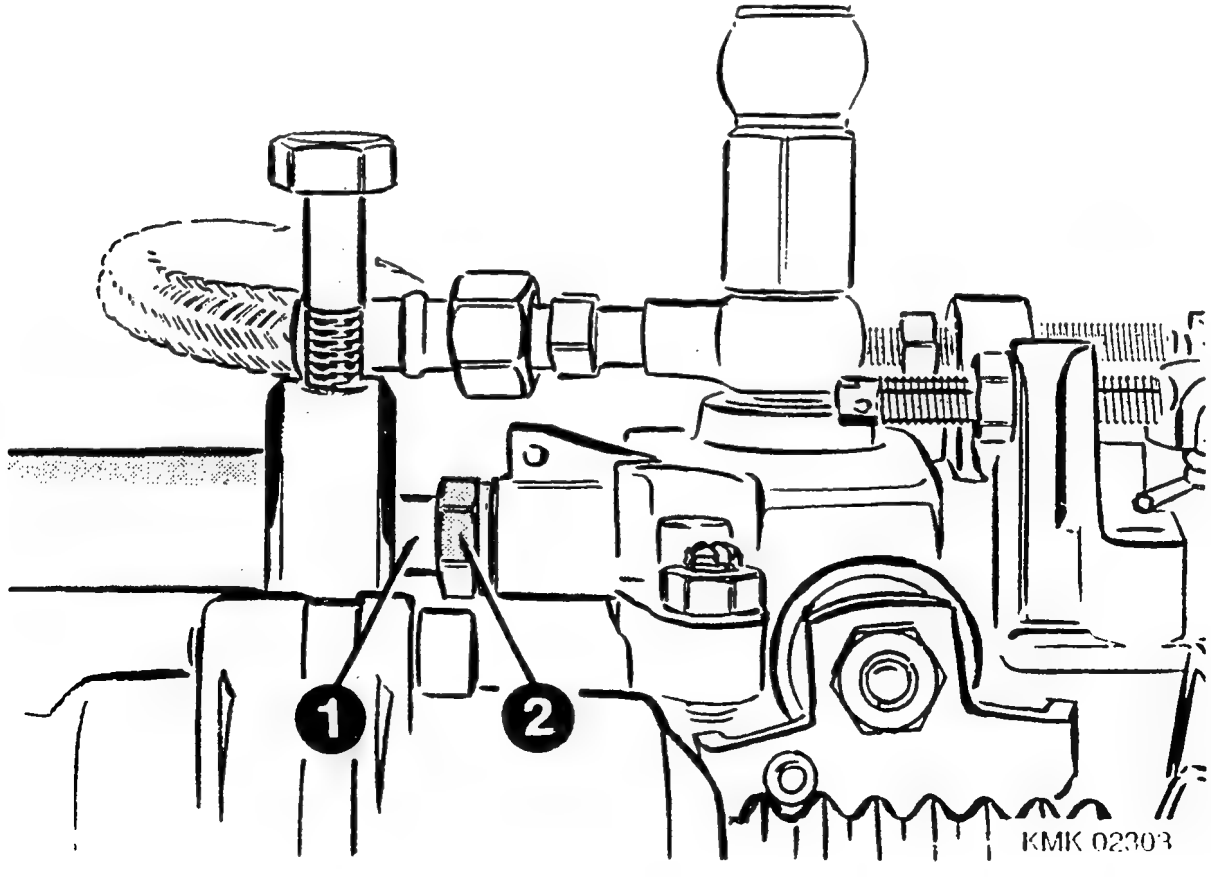


FITTING FULL-LOAD STOP
 * Locking-sleeve version

1 = Spacer sleeve
2 = Hexagon nut

Screw in stamping screw by hand until it makes contact with locking sleeve; turn on a further 1 1/2 turns with open-ended wrench.
Remove stamping tool.
The max. gap between locking sleeve and hexagon nut is 0.3 mm.

Continue: H08/1 Fig.: H05/2



FITTING FULL-LOAD STOP
 * Version with sealing cap

1 = Full-load adjusting screw
2 = Lock nut with identification groove
3 = Sealing cap

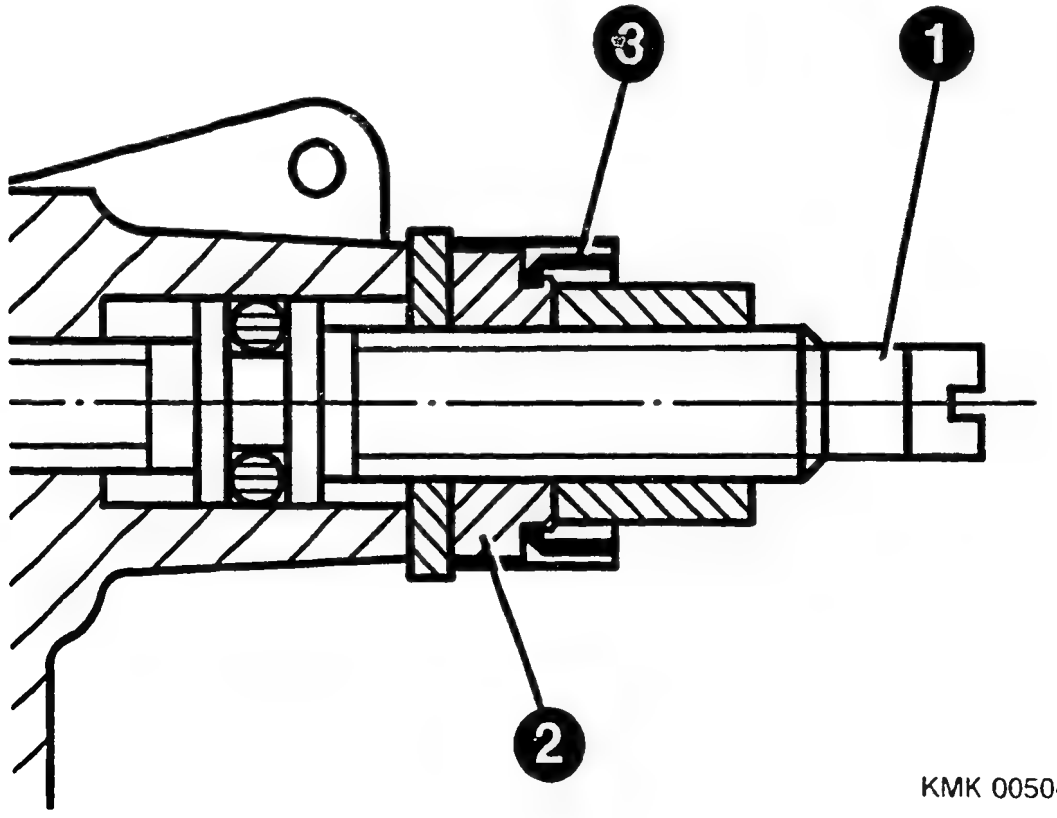
Full-load adjusting screw:

Hexagon nut M8	Sealing cap (red)
1 463 315 306	1 460 591 313

Adjusting screw, upper rated speed:

Hexagon nut M6	Sealing cap (red)
1 463 315 307	2 420 580 005

Continue: H07/1 Fig.: H06/2



KMK 00504

FITTING FULL-LOAD STOP
* Version with sealing cap

Press on sealing cap as follows

Position inside diameter of sealing cap in sealing tool.
Press cap by means of assembly tool into groove in lock nut.
Cap must engage.

Tools required:
* KDEP 1187 for full-load adjusting screw
* KDEP 1188 for rated-speed adjusting screw

Continue: H08/1

ADJUSTING ADD-ON MODULES

Select adjustment sequence in line with following add-on modules:

	Coordinate
* Adjusting temperature-controlled starting fuel delivery (TAS)	H12/1
* Adjusting temperature-controlled idle increase (TLA) via roller ring KSB.....	H17/1
* Temperature-controlled idle increase on coolant basis.....	H26/1

Continue: H08/2

ADJUSTING ADD-ON MODULES

Select adjustment sequence in line with following add-on modules:

	Coordinate
* Temperature-controlled idle increase (TLA) acting on housing-fixed idle spring....	J01/1
* Adjusting EGR driver.....	J03/1
POTENTIOMETER ADJUSTMENT	
* Pump with 3rd part-load delivery stop.....	J05/1

Continue: H09/1

ADJUSTING ADD-ON MODULES

Select adjustment sequence in line
with following add-on modules:

	Coordinate
POTENTIOMETER ADJUSTMENT	
* Pump with 3rd and 4th part-load delivery stop.....	J09/1
MICROSWITCH ADJUSTMENT	
* Pump W I T H potentiometer..	J15/1
* Pump W I T H N O potentiometer	J21/1

Continue: H09/2

ADJUSTING ADD-ON MODULES

Select adjustment sequence in line
with following add-on modules:

	Coordinate
* Assignment of LFG stop lever to timing device KSB (SV-KSB).....	J26/1
* Spherical bolt spacing for hydraulic damper	
- Pump with SV-KSB with LFG...	K04/1
* Attaching lever for spring-actuated power on/off damper.....	K07/1

Continue: H10/1

ADJUSTING ADD-ON MODULES

Select adjustment sequence in line
with following add-on modules:

	Coordinate
* Setting part-load stop, exhaust-gas recirculation (ARF) Pump with HBA.....	K09/1
* Temperature-controlled KSB with idle increase acting on roller ring – Pump with HBA.....	K11/1
* Assignment of control lever to linkage, throttle valve – Pump with HBA.....	K15/1

Continue: H10/1

ADJUSTING ADD-ON MODULES

Select start of delivery in accordance
with following characteristics:

	Coordinate
* Blocking of drive shaft W I T H O U T locking screw (e.g. VE..R119)	K18/1
* Blocking of drive shaft W I T H locking screw Data in test-specification sheet "start-of-delivery blocking.....	K24/1

Continue: H11/1

ADJUSTING ADD-ON MODULES

Adjustment sequence in accordance with following lever systems:

	Coordinate
* 2-piece control-lever system:	
- Control-lever position	
(XK) adjustment	L05/1
(XL) adjustment	L09/1
* Stamping of control lever	L10/1
* Checking of full-load delivery	L11/1
* 1-piece control lever:	
- Control-lever position	
(A) adjustment	L13/1
(B) adjustment	L16/1

Continue: H11/2

ADJUSTING ADD-ON MODULES

Select functional test in accordance with following characteristics:

	Coordinate
Spring-actuated power on/off damper (FLD).....	L18/1
Mechanical power on/off damper (MLD).....	L20/1
Frequency valve.....	L21/1
Shutoff solenoid.....	L22/1
CALIBRATION WORK	
Sliding-sleeve starting travel.....	L23/1

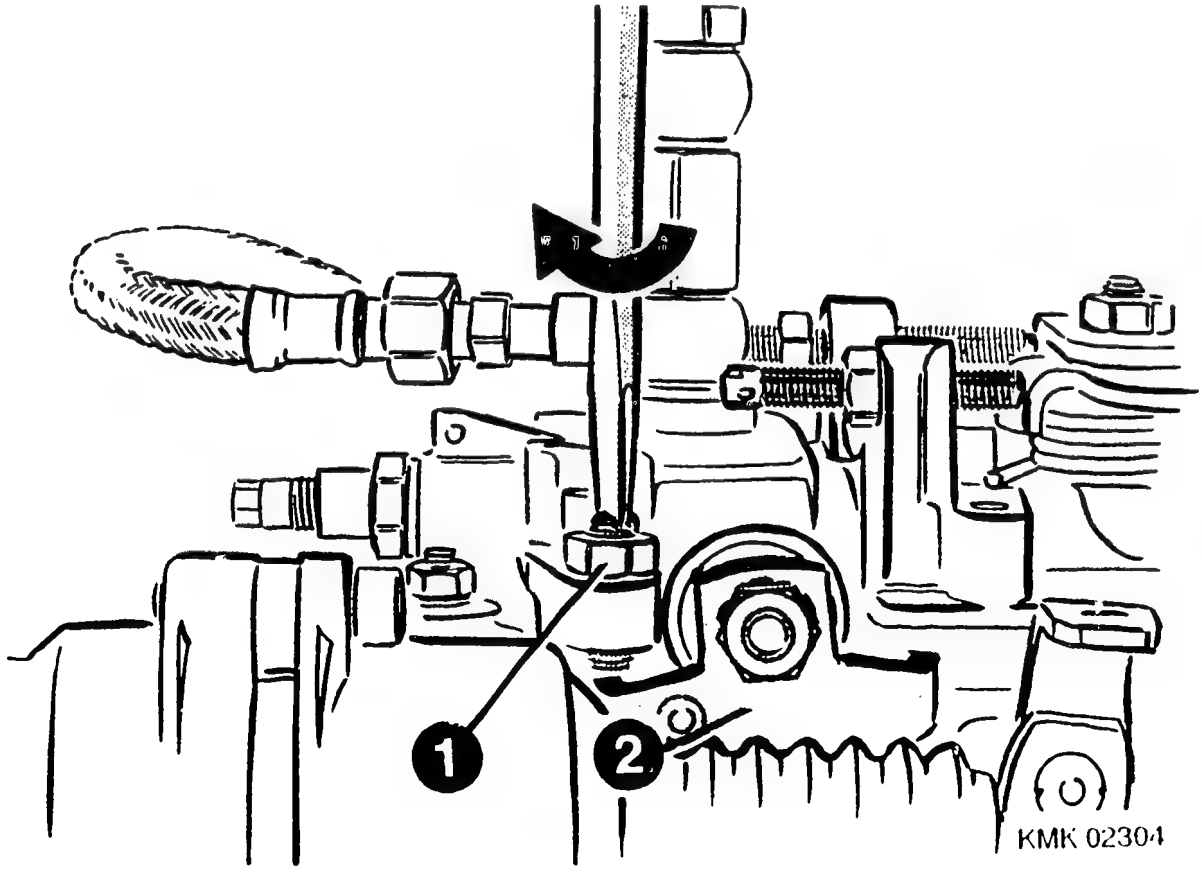
Continue: H12/1

ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Threaded pin
2 = Regulating lever

Position speed-control lever at rated-speed adjusting screw.
Completely screw back threaded pin.
Press regulating lever (as far as pressure point at fulcrum lever) in direction of distributor head.
This causes the starting spring to make contact with the fulcrum lever.
Do not overpress fulcrum lever.
Hold regulating lever in this position.

Continue: H13/1 Fig.: H12/2

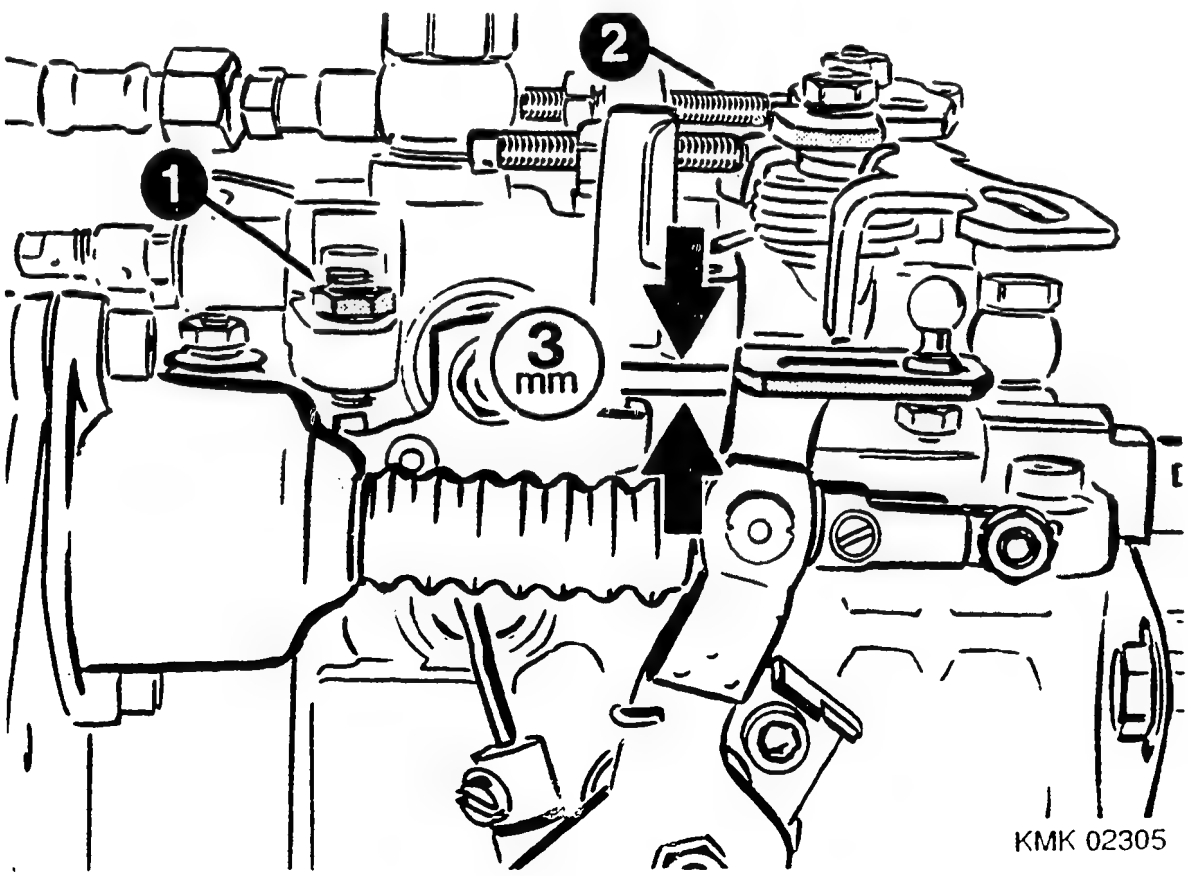


ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Threaded pin
2 = Idle adjusting screw

Screw threaded pin in until it makes contact with regulating lever.
Continue turning threaded pin in direction of regulating lever 1/4 - 1/2 of a turn.
Distance between regulating lever and housing stop must be at least 3 mm.
Tighten lock nut to 6...9 Nm.
Position speed-control lever at idle adjusting screw.

Continue: H14/1 Fig.: H13/2

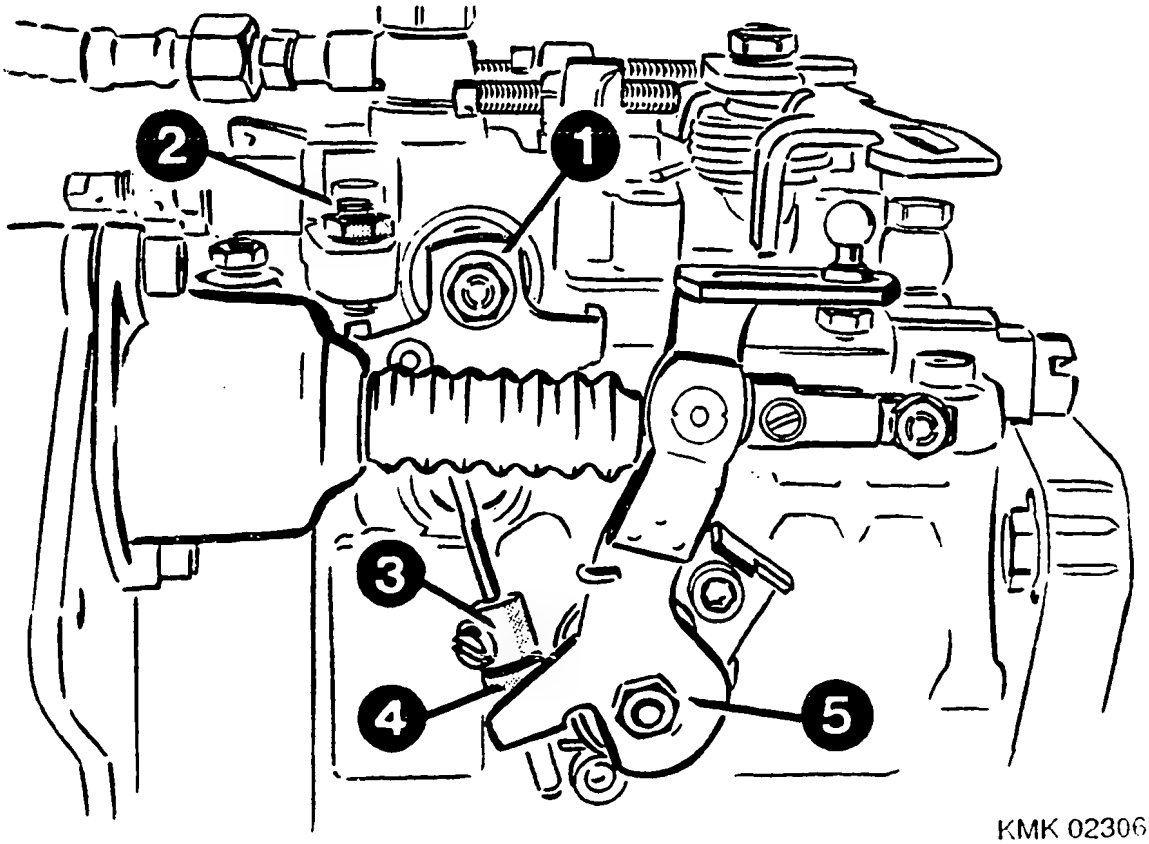


ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Regulating lever
2 = Threaded pin
3 = Clamp bushing
4 = Locating pin
5 = Speed-control lever

Position regulating lever at threaded pin.
Fix regulating lever in this position.
Engage clamp bushing with locating pin in control lever; to do so, press control lever in direction of distributor head.
Position control lever at stop bracket.

Continue: H15/1 Fig.: H14/2



KMK 02306

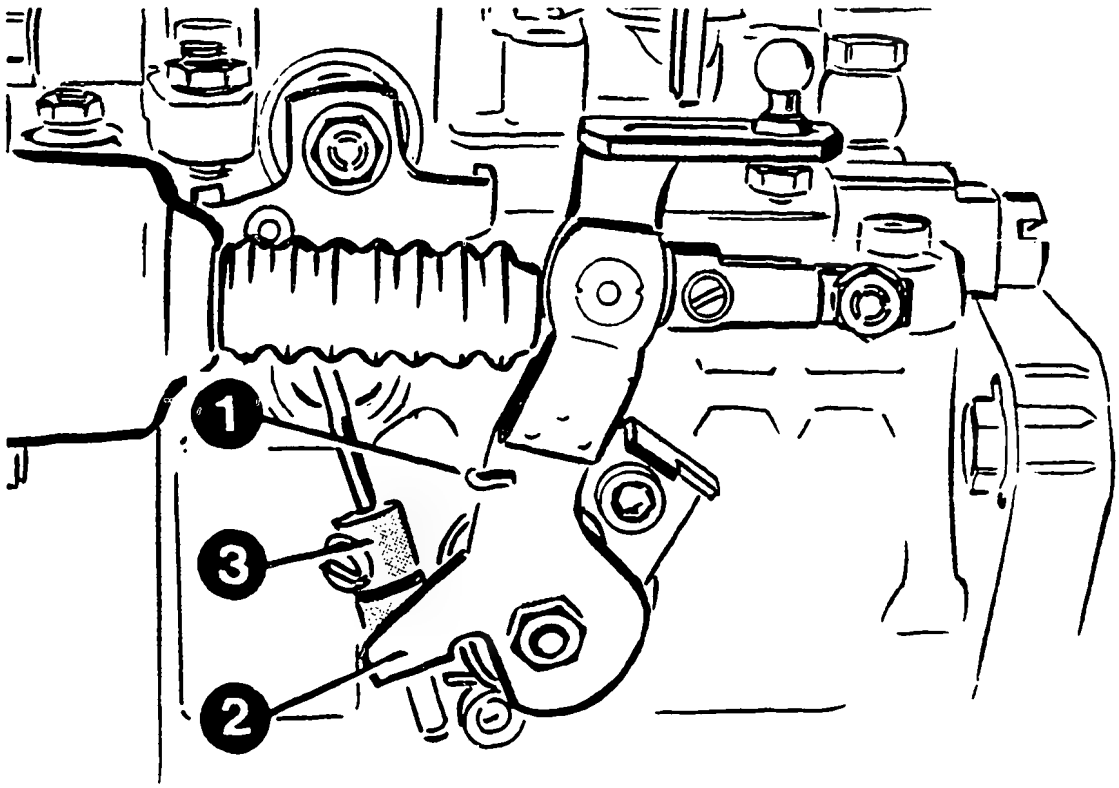
ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Cylindrical helical coiled spring
2 = Control lever
3 = Clamp bushing

Control lever must be in contact with stop bracket for following operation.

Engage cylindrical helical coiled spring in control lever.

Continue: H16/1 Fig.: H15/2



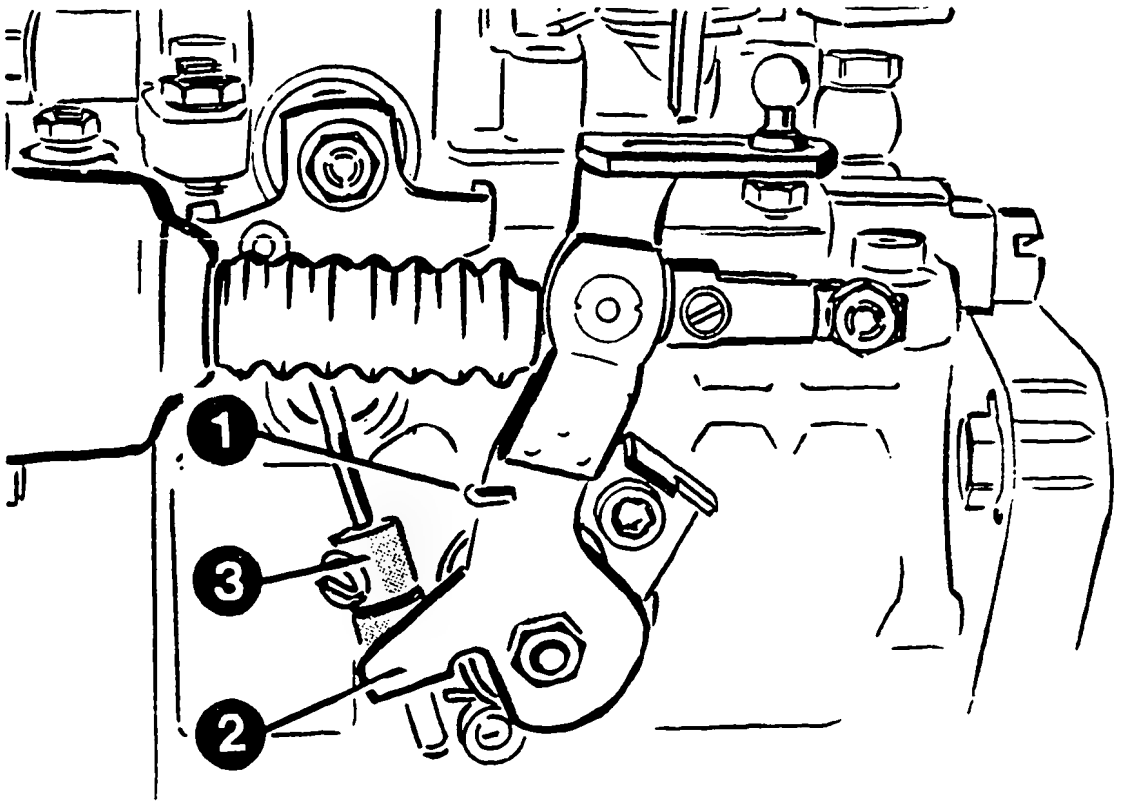
KMK 02307

ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Cylindrical helical coiled spring
2 = Control lever (regulating lever)
3 = Clamp bushing

Press connecting rod against regulating lever.
Press clamp bushing against control lever and tighten fillister-head screw.
Disengage cylindrical helical coiled spring from control lever.

Continue: H08/1 Fig.: H16/2



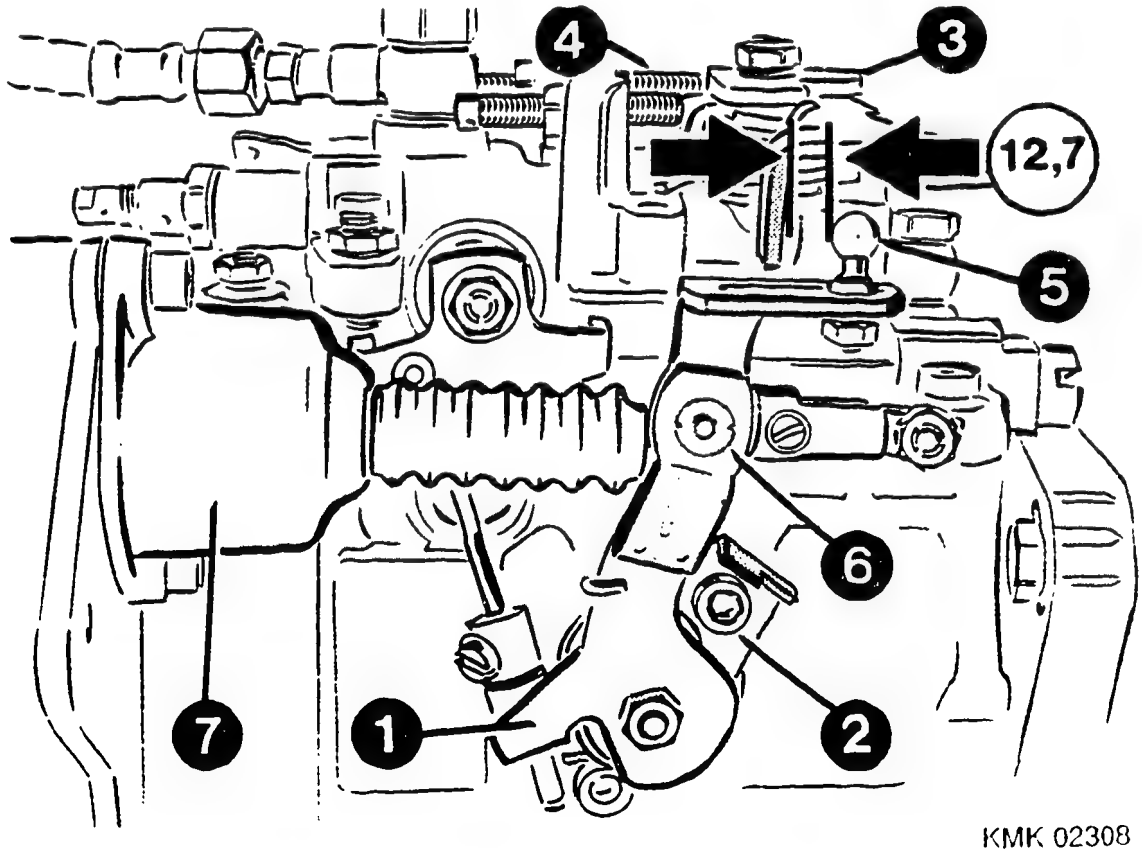
KMK 02307

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE (TLA) BY WAY OF CAM ROLLER RING

1 = Control lever
2 = Stop bracket
3 = Speed-control lever
4 = Idle adjusting screw

Position control lever at stop bracket. Speed-control lever makes contact with idle adjustment screw.

Continue: H18/1 Fig.: H17/2



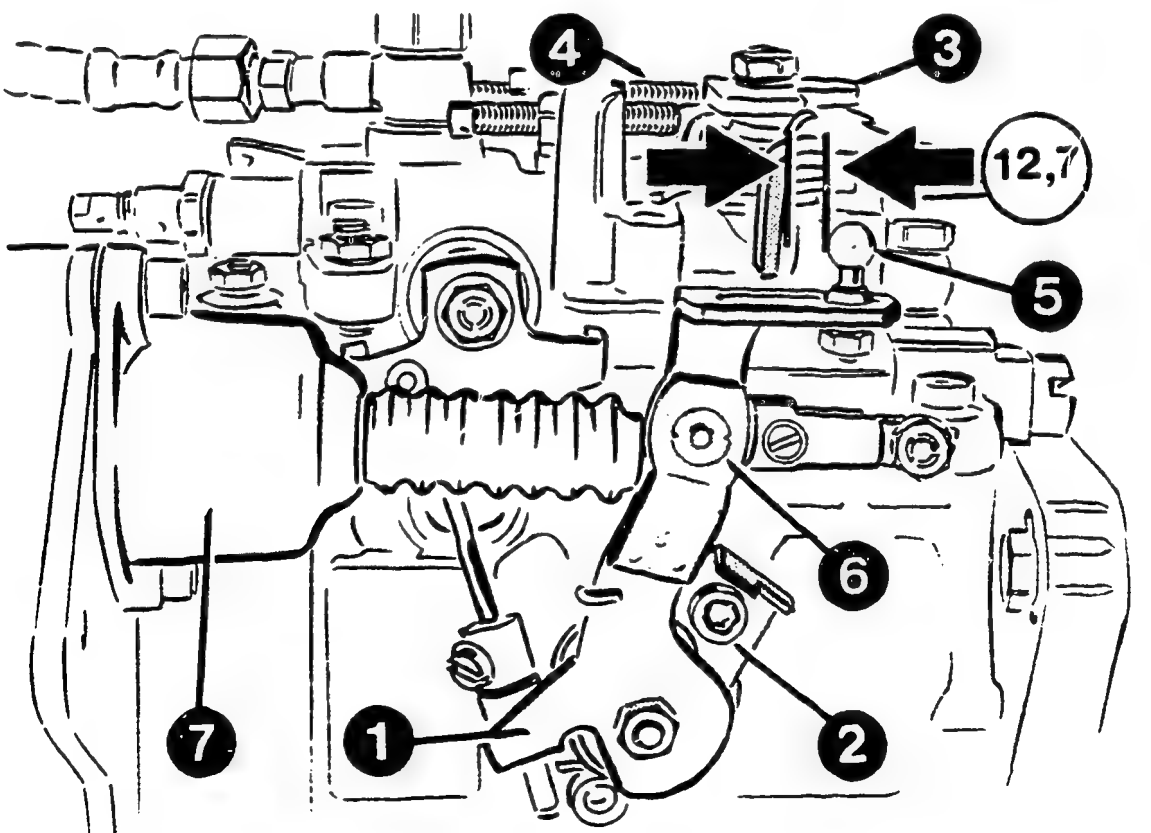
KMK 02308

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE (TLA) BY WAY OF CAM ROLLER RING

5 = Ball stud
6 = Intermediate piece
7 = Control device

Set ball stud such that it is 12.7 mm from speed-control lever (refer to test-specification sheet for deviation).
Insert intermediate piece into control lever.
Insert cable of control device into hole in intermediate piece.
Completely install control device at distributor head. Screw in and tighten fastening screws.

Continue: H19/1 Fig.: H18/2



KMK 02308

ADJUSTING CONTROL DEVICE
* Determining KSB stroke

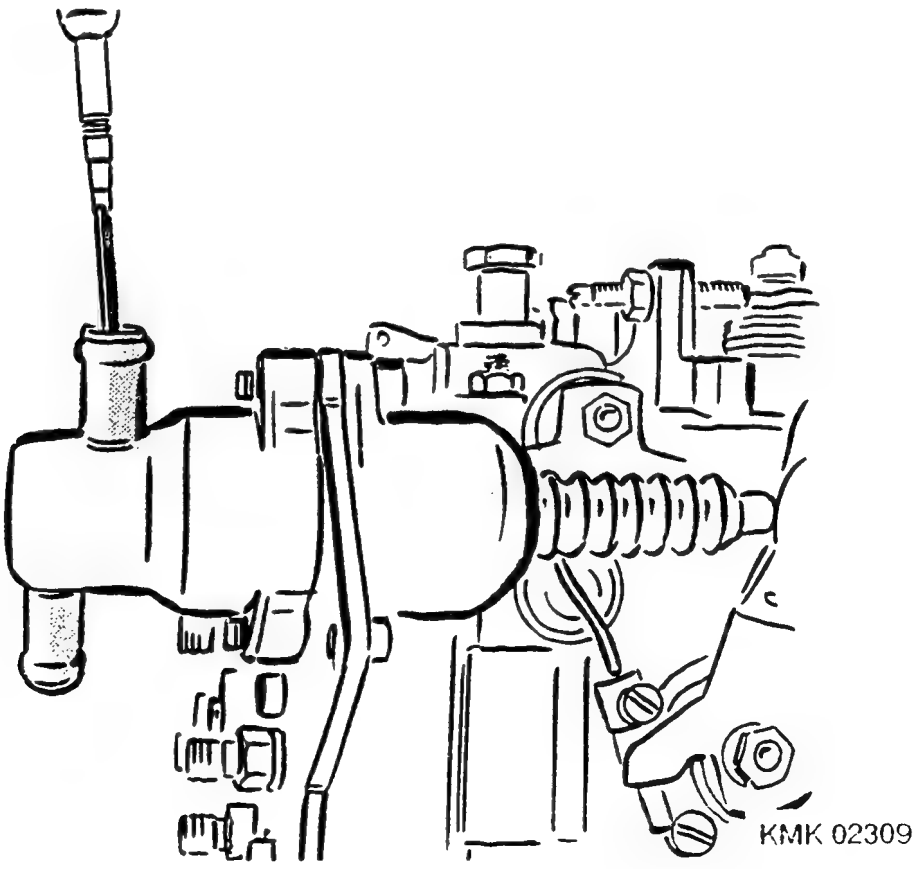
Slip intermediate piece and clamping piece onto cable.

* Determine temperature of control device (2 posibilities)

a) Measurement with electronic temperature gauge.

Determine temperature of control device with commercially available electronic temperature gauge.
To do so, place sensor in control device (picture).
Transfer temperature determined to graph and read off KSB stroke set value.

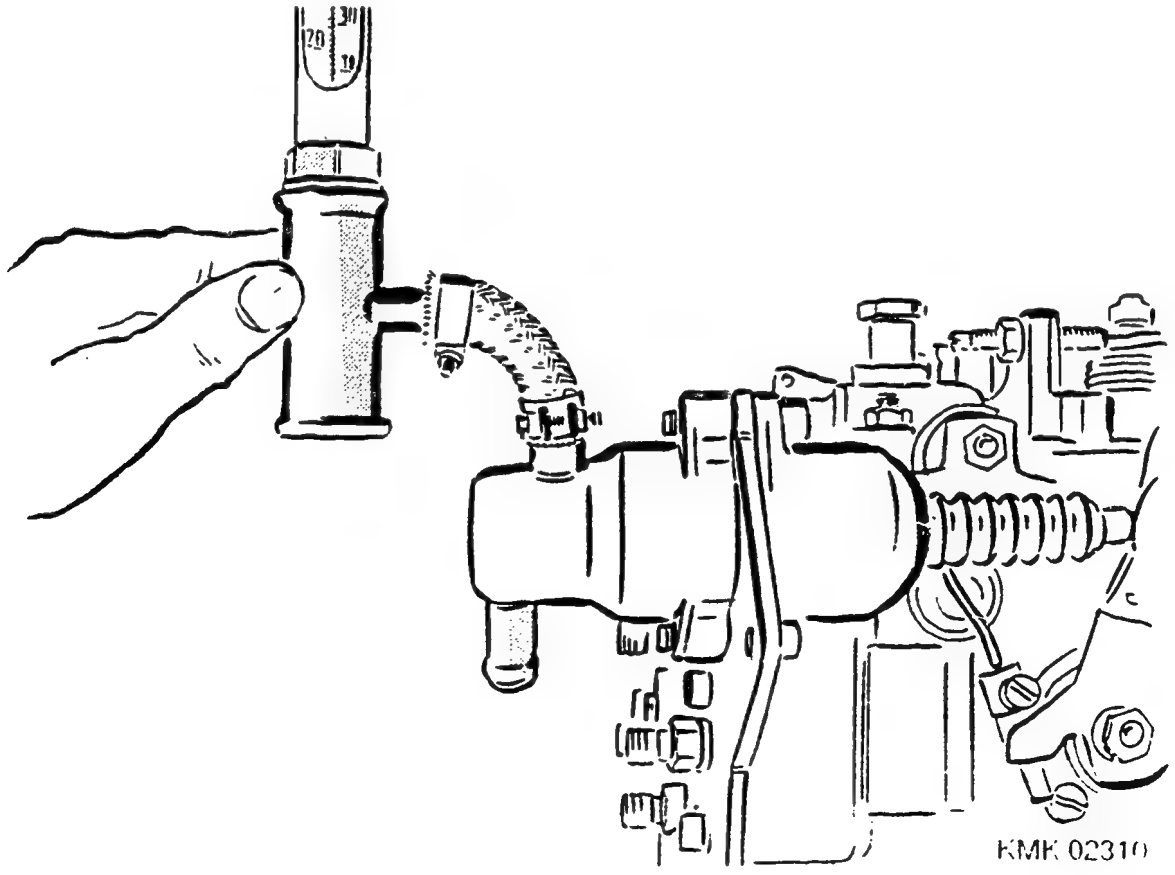
Continue: H20/1 Fig.: H19/2



ADJUSTING CONTROL DEVICE
* Determining KSB stroke
b) Measurement with thermometer

Remove pump from test bench and clamp to clamping frame KDEP 2919.
Connect up thermometer KDEP 2742 to control device with appropriate tubing.
Guide return hose of control device into vessel.
Flush water chamber of control device with warm water (approx. 50°C).
Read temperature off thermometer.
Transfer temperature determined to graph and read off KSB stroke set value.

Continue: H21/1 Fig.: H20/2



ADJUSTING CONTROL DEVICE

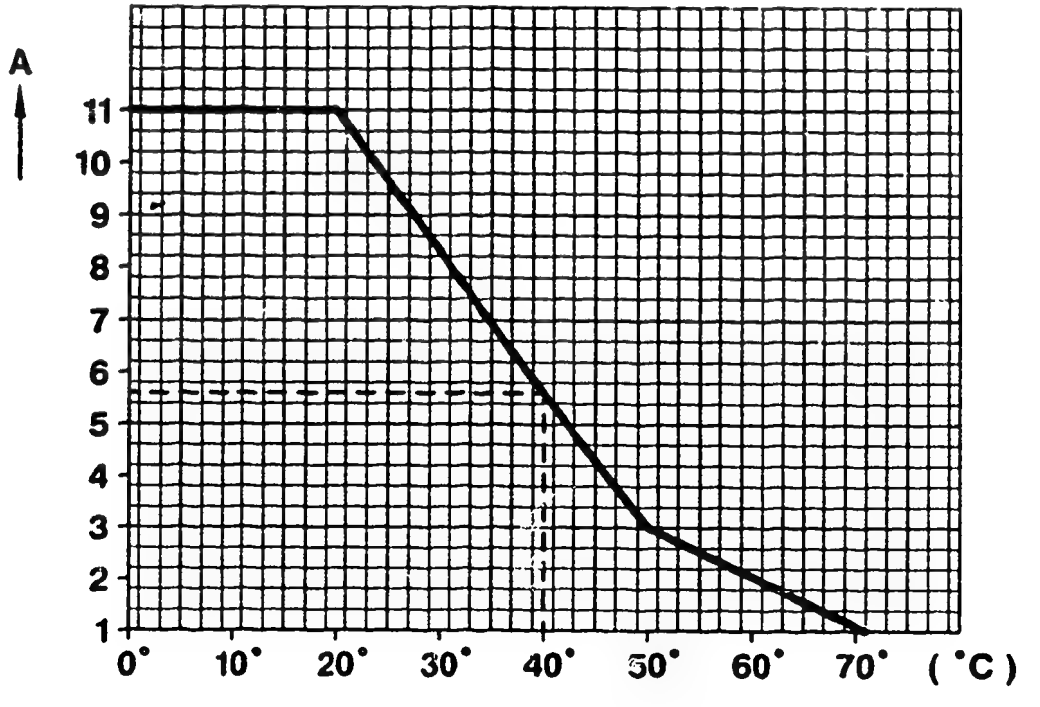
A = Stroke – KSB mm

Position temperature determined with thermometer at lower scale.

Read off required stroke from vertical scale on graph.

Example:
Temperature determined = 40°C
Stroke required = 5.7 mm

Continue: H22/1 Fig.: H21/2



KMK02311

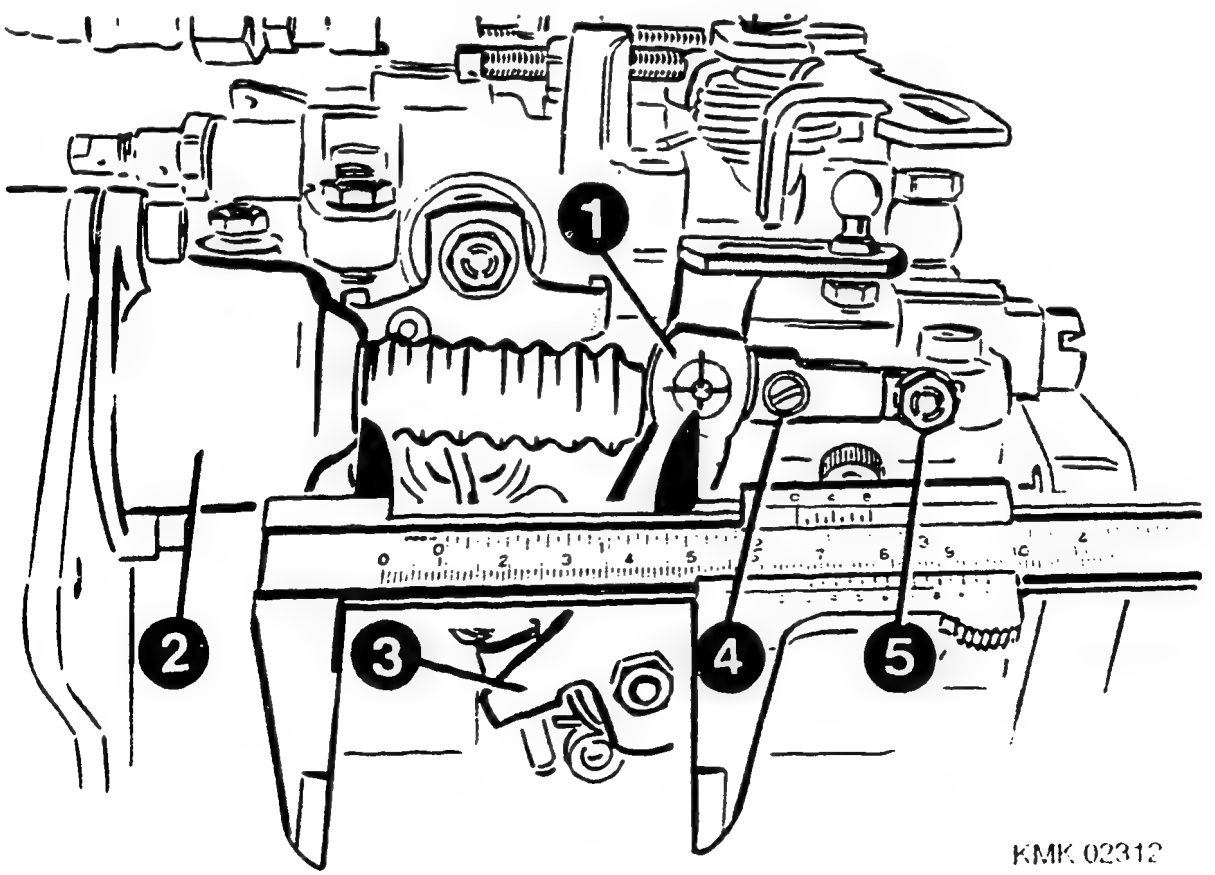
ADJUSTING CONTROL DEVICE

1 = Intermediate piece
2 = Control device
3 = Control lever

* Adjustment of control-device cable

Position control lever at cam roller ring.
Measure distance between center of intermediate piece and control device.
Subtract stroke determined from this dimension.
Set control lever to this new dimension (stroke required).

Continue: H23/1 Fig.: H22/2



ADJUSTING CONTROL DEVICE

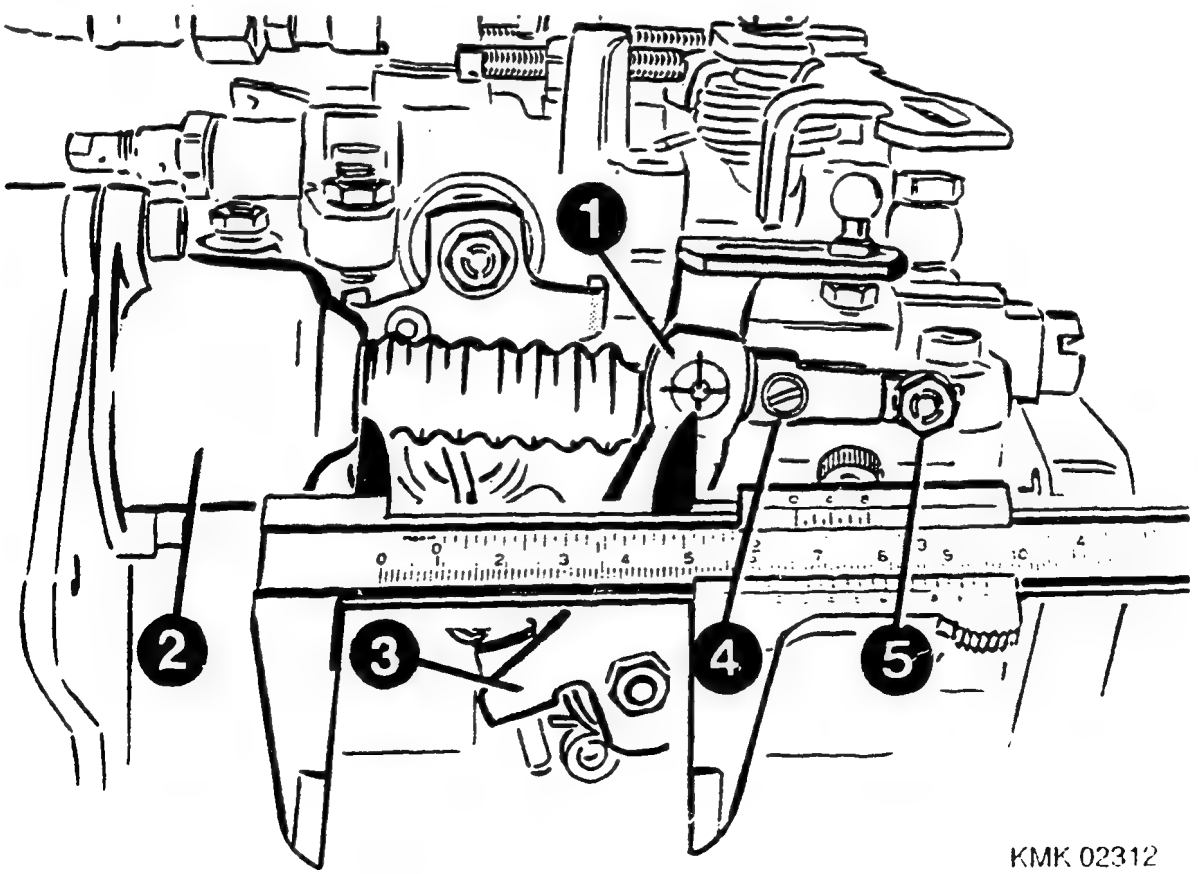
4 = Intermediate piece
5 = Clamping piece

* Control-device cable adjustment

Fix control lever in this position by way of intermediate piece and clamping piece.

Loosen intermediate piece and push in direction of control lever.

Continue: H24/1 Fig.: H23/2



KMK 02312

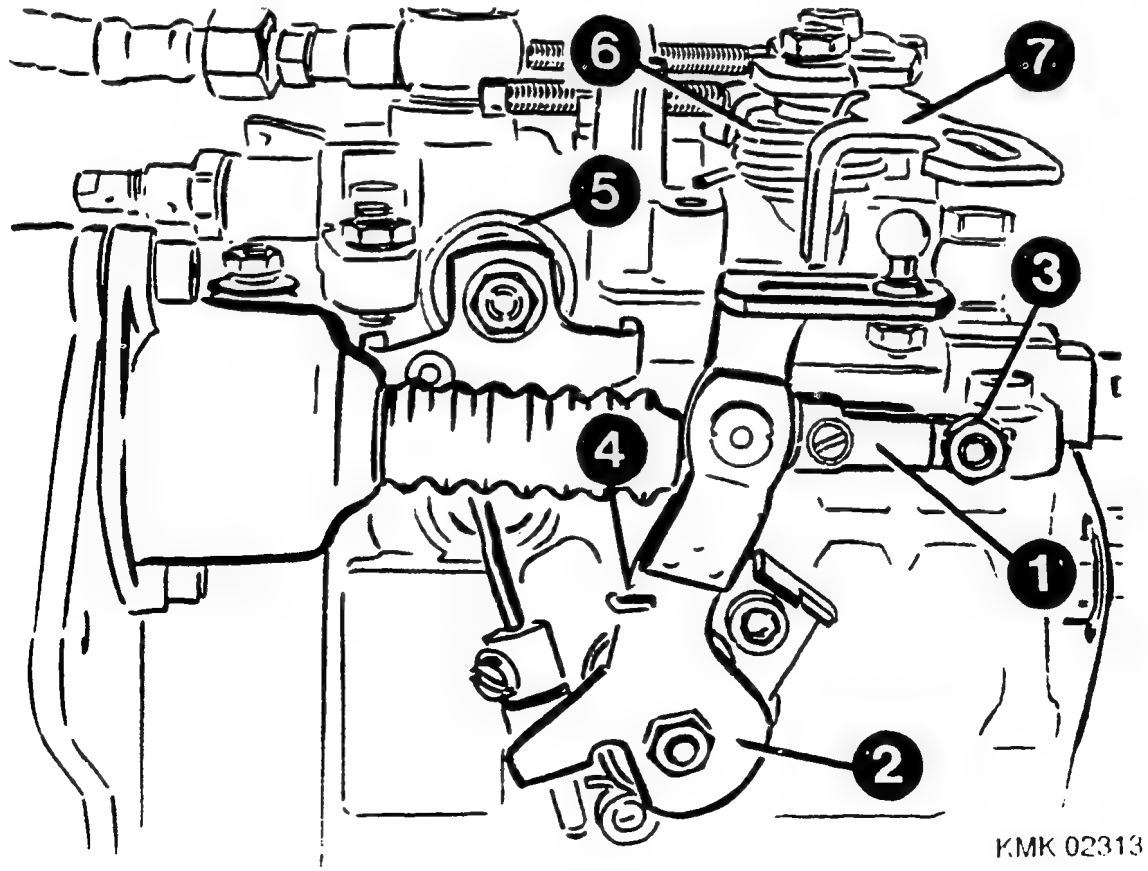
ADJUSTING CONTROL DEVICE

1 = Intermediate piece
2 = Control lever
3 = Clamping lever
4 = Cylindrical helical coiled spring (cam roller ring)
5 = Cylindrical helical coiled spring (regulating lever)

* Control-device cable adjustment

Turn intermediate piece through 90° and push in direction of clamping piece as far as stop.
Engage cylindrical helical coiled spring in control lever, cam roller ring.
Insert cylindrical helical coiled spring into hole in regulating lever.

Continue: H25/1 Fig.: H24/2



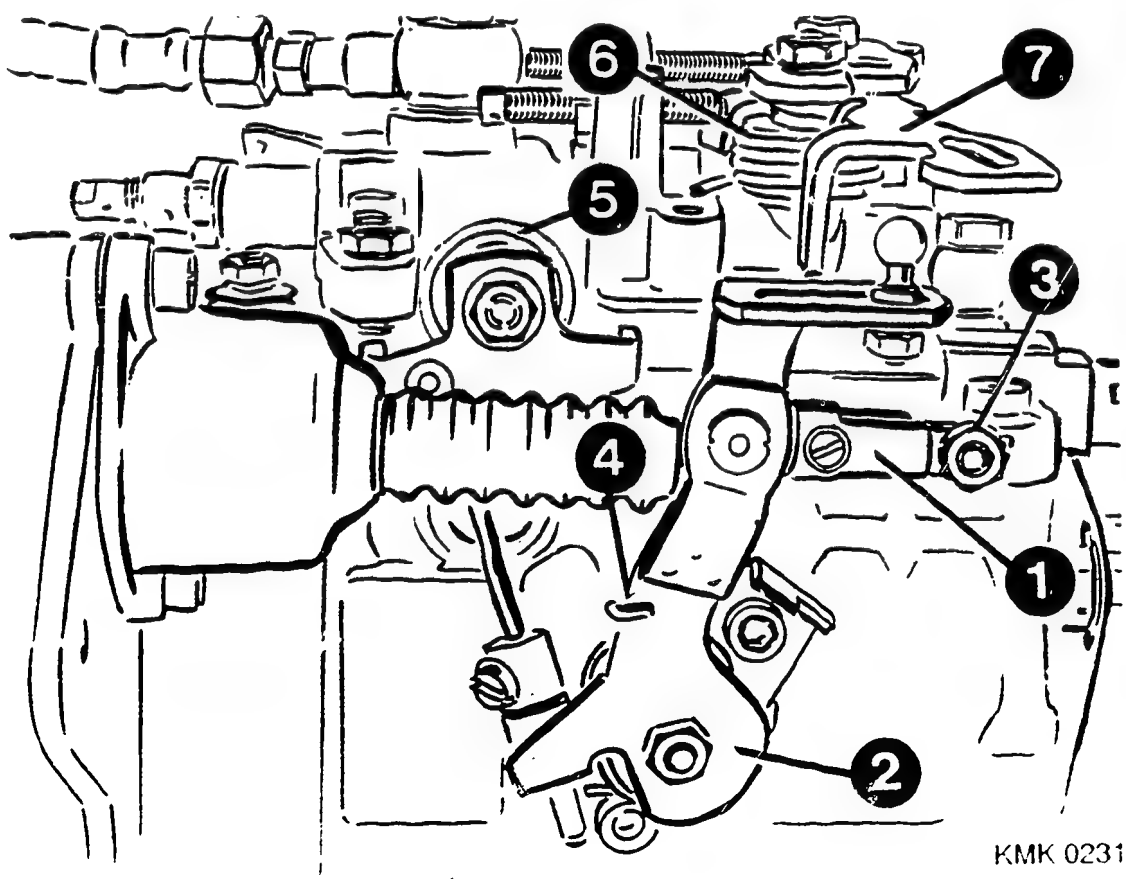
ADJUSTING CONTROL DEVICE

6 = Cylindrical helical coiled spring
(speed-control lever)
7 = Speed-control lever

Remove distributor-type fuel-injection pump from test bench and seal.

Attach distributor-type fuel-injection pump to engine in this position.

Continue: H08/1 Fig.: H25/2



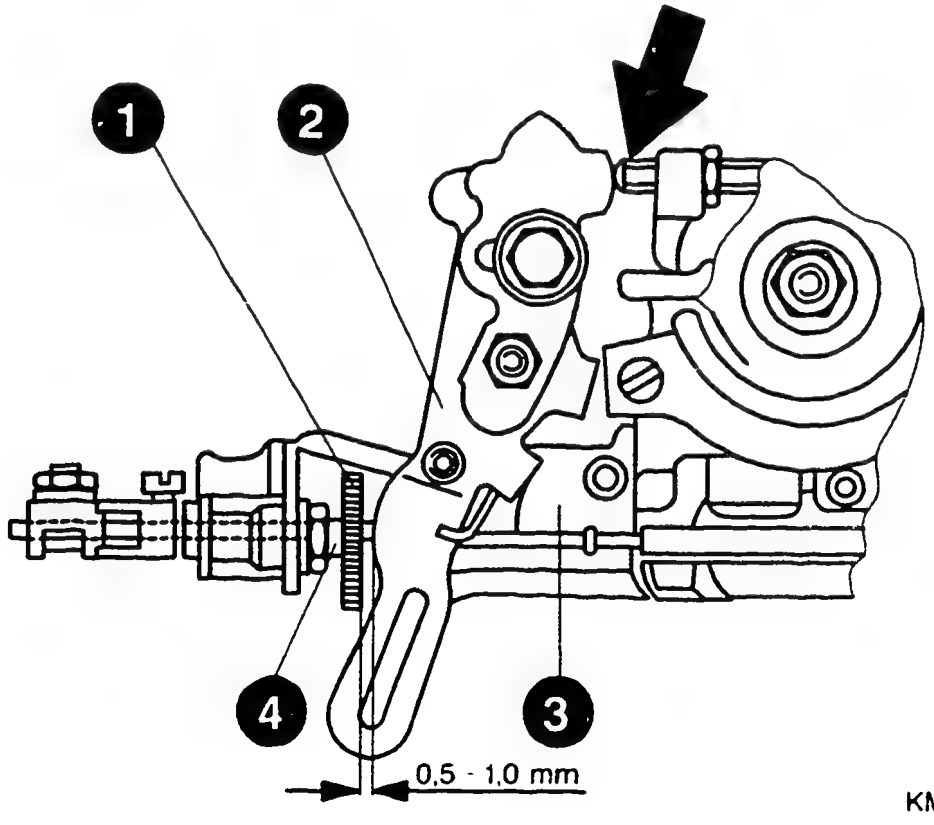
SETTING TEMPERATURE-CONTROLLED IDLE INCREASE ON COOLANT BASIS

1 = Knurled screw
2 = Control lever
3 = Mounting bracket
4 = Inlet-union screw

Fit mounting bracket without control device.
Position control lever against idle stop screw (arrow).
Insert knurled screw into inlet-union screw.

Set spacing 0.5...1.0 mm.

Continue: H27/1 Fig.: H26/2



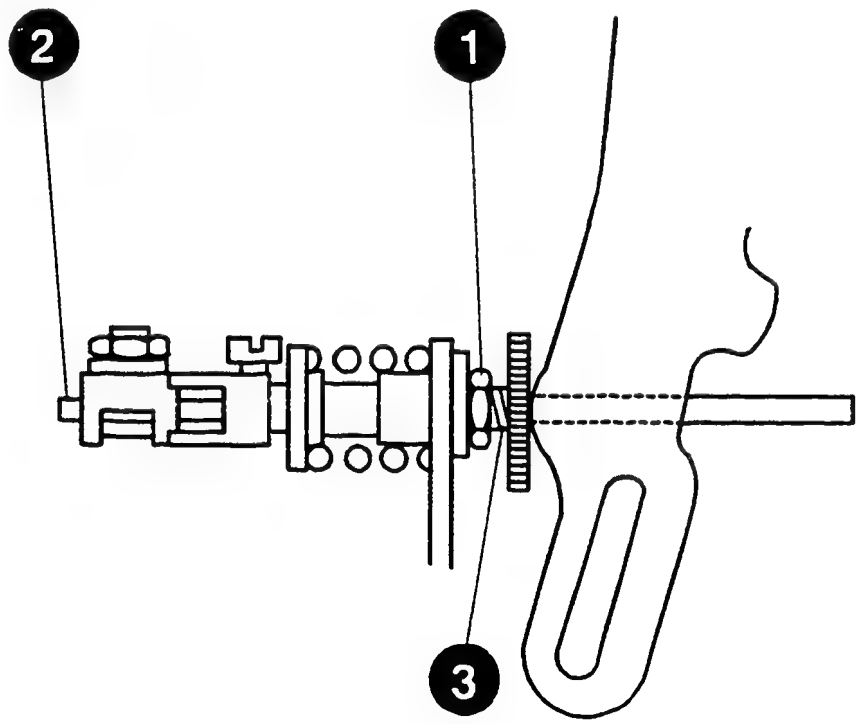
KMK02980

SETTING TEMPERATURE-CONTROLLED IDLE INCREASE ON COOLANT BASIS

1 = Lock nut
2 = Control cable
3 = Inlet-union screw

Secure knurled screw with lock nut.
Attach control device to distributor-type fuel-injection pump.
Guide control cable through hole in inlet-union screw.

Continue: H28/1 Fig.: H27/2



KMK02981

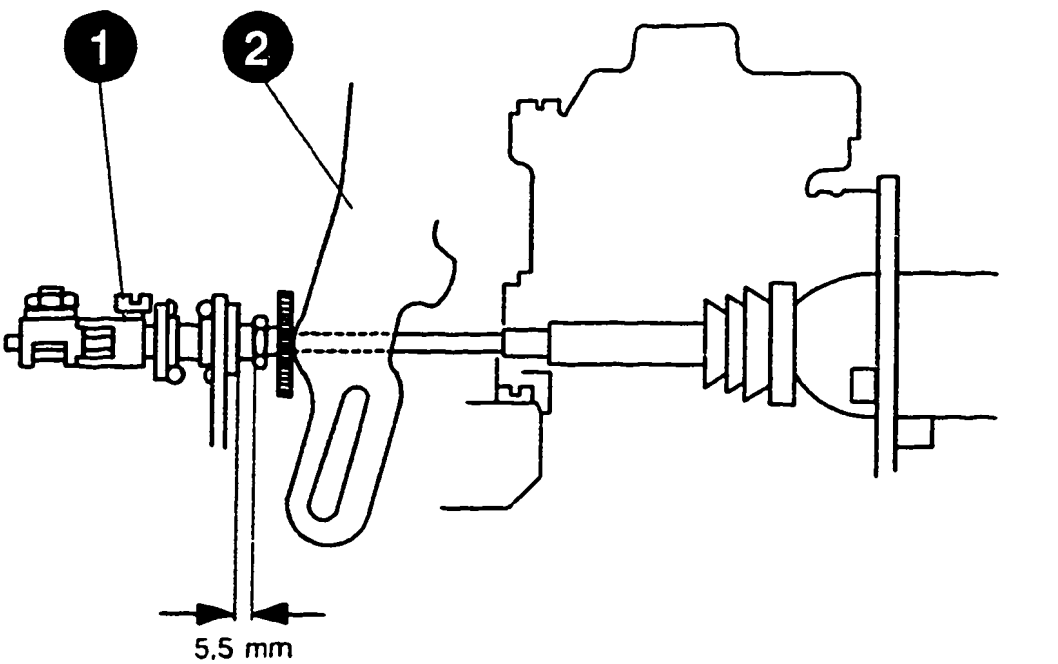
SETTING TEMPERATURE-CONTROLLED IDLE INCREASE ON COOLANT BASIS

1 = Clamping screw
2 = Control lever

Position control lever against rated-speed adjusting screw.

Press down knurled screw 5,5 mm. Fix control cable in this position with clamping screw.

Continue: H08/1 Fig.: H28/2



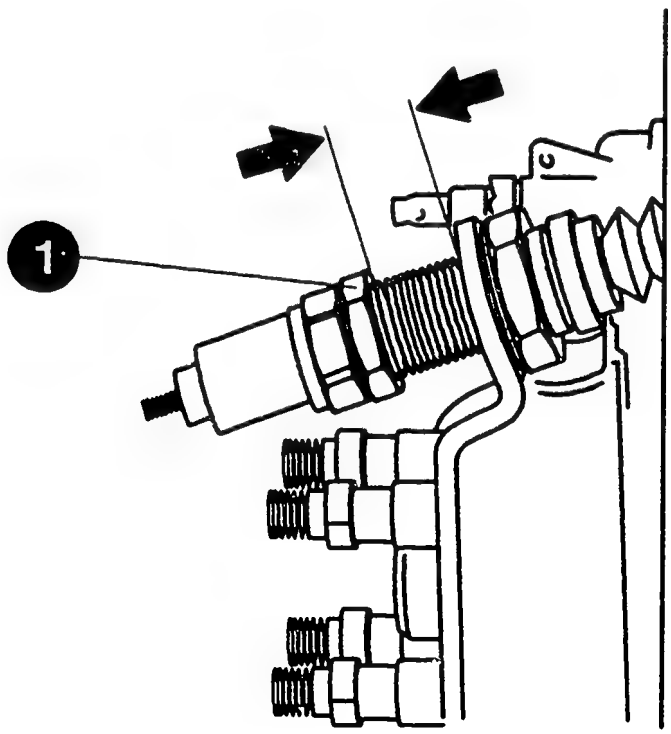
KMK02982

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE ACTING ON HOUSING-FIXED IDLE SPRING

1 = Control housing

Prerequisite:
Pump completely adjusted.
Screw control housing (thermocouple support) into support bracket until basic dimension of 5.3...5.7 mm (distance between support bracket and hexagon nut of control housing) is attained.

Continue: J02/1 Fig.: J01/2



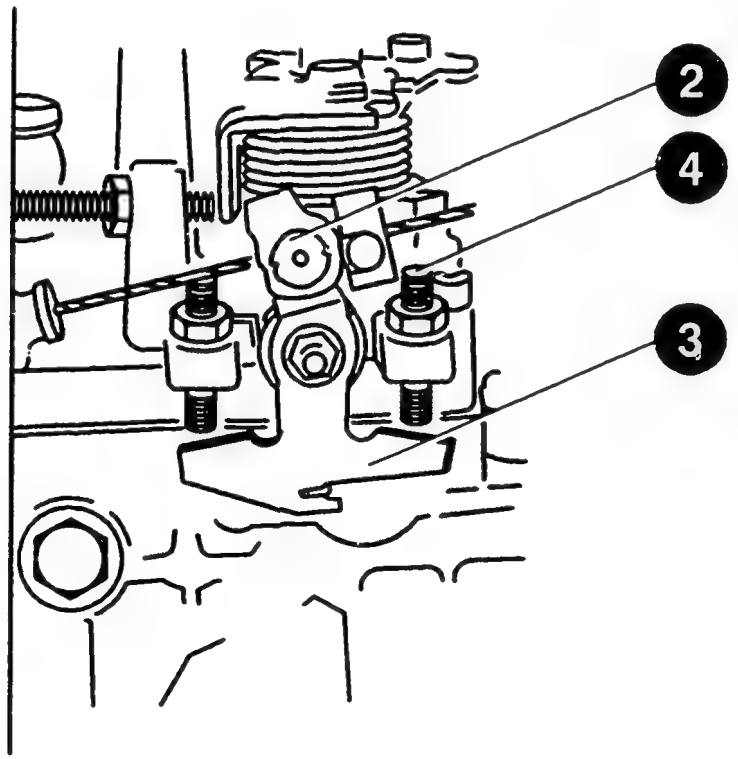
KMK02314

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE ACTING ON HOUSING-FIXED IDLE SPRING

2 = Intermediate piece
3 = LFG stop lever
4 = Stop screw for high idle

Thread tie rod into intermediate piece. Position LFG stop lever at stop for high idle.
Thread clamping piece into tie rod, press clamping piece against LFG stop lever and tighten clamping screw to 3.5...4.5 Nm.

Continue: H08/1 Fig.: J02/2



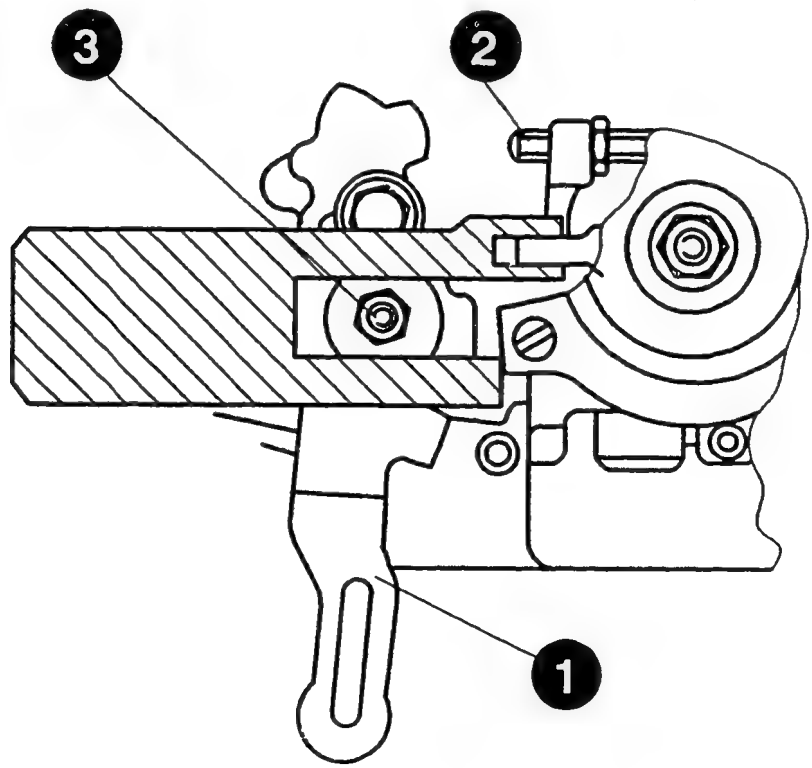
KMK02315

ADJUSTING DRIVER FOR EGR RATE

1 = Speed-control lever
2 = Idle stop
3 = Drive coupling for EGR valve

Test prerequisite:
Supply pump pressure, timing device travel and deliveries must have been set.
Set adjustment speed.
Move speed-control lever from idle stop in direction of rated speed until delivery as per test-specification sheet is obtained.

Continue: J04/1 Fig.: J03/2



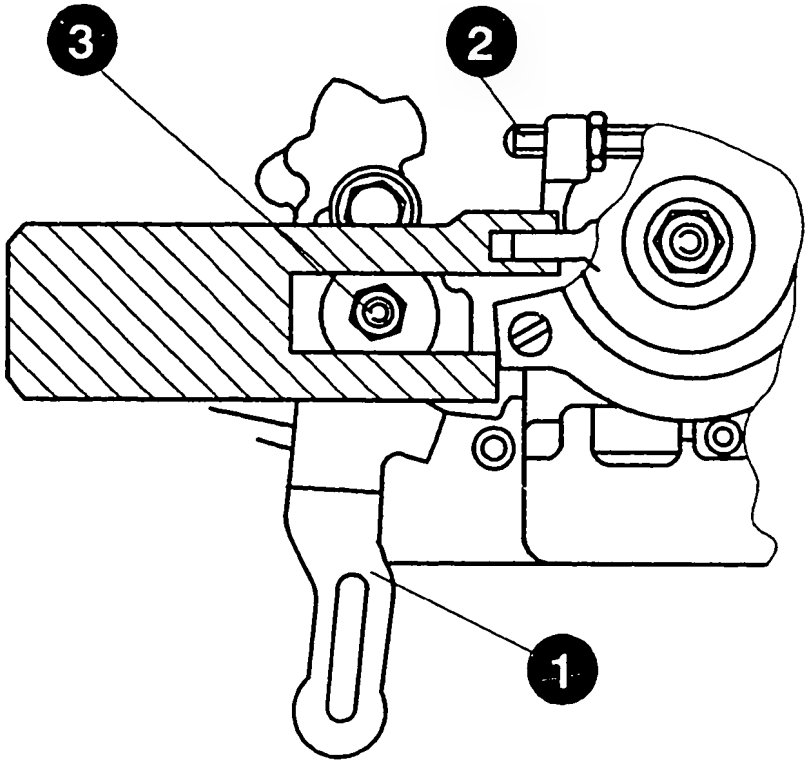
KMK02983

ADJUSTING DRIVER FOR EGR RATE

1 = Speed-control lever
2 = Idle stop
3 = Drive coupling for EGR valve

Fix speed-control lever in this position.
Loosen fastening nut of driver and fit adjustment gauge KDEP 1027.
Turn driver until adjustment gauge can be inserted into a web at LDA housing.
Secure driver and remove adjustment gauge.

Continue: H08/1 Fig.: J04/2



KMK02983

POTENTIOMETER ADJUSTMENT

LEVER POSITIONS OF VARIOUS
POTENTIOMETER VARIANTS

* Injection pump with 3rd part-load delivery stop.

Position speed-control lever against idle/residual-quantity stop.

* Injection pump with 3rd and 4th part-load delivery stop.

Position speed-control lever with spacer against 3rd and 4th stop.

Continue: J06/1

POTENTIOMETER ADJUSTMENT
* Pump with 3rd part-load delivery stop

Arrow = Spacer 11.8 mm

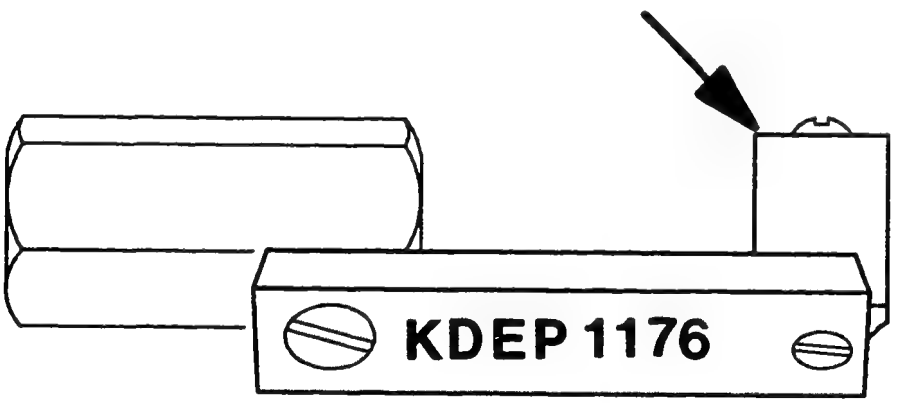
ADJUSTMENT INSTRUCTIONS:

Remove necessary spacer from range spacer KDEP 1176.

Press speed-control lever with auxiliary spring against spacer.

Use feeler gauge to provide compensation for difference with respect to stated dimensions in each case.

Continue: J07/1 Fig.: J06/2



KMK01530

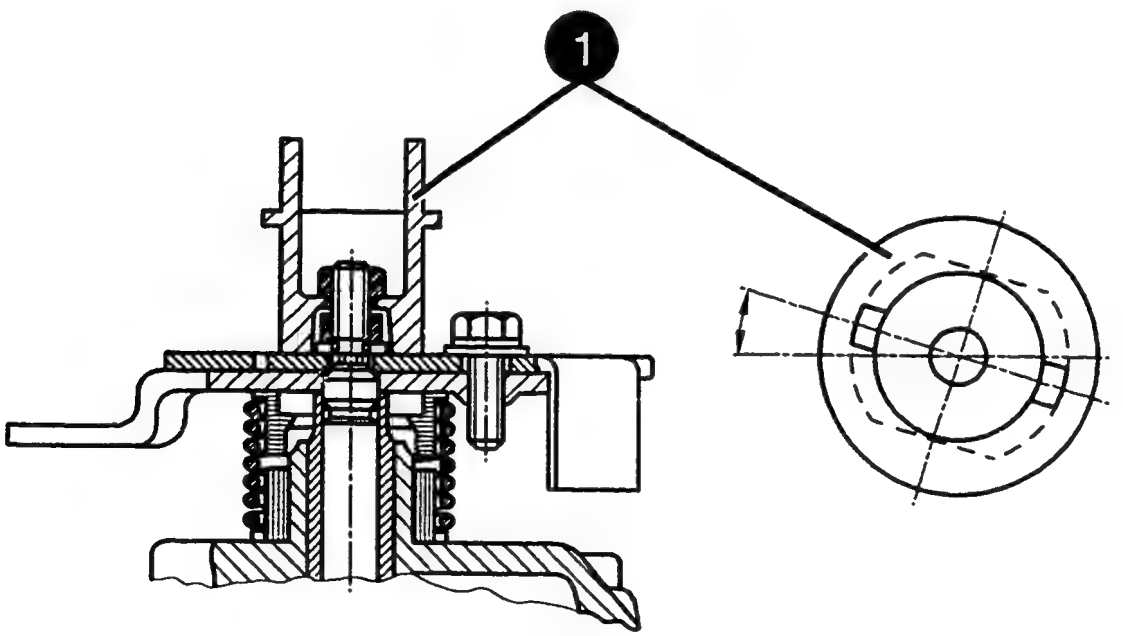
POTENTIOMETER ADJUSTMENT
* Pump with 3rd part-load delivery stop

1 = Driver

Prerequisite:
Injection pump completely adjusted.

Install driver on preassembly bracket (as per test-specification sheet) with speed-control lever in contact with idle/residual-quantity stop.
Tighten driver to prescribed torque.
Install potentiometer, slightly tighten mounting plate.

Continue: J08/1 Fig.: J07/2



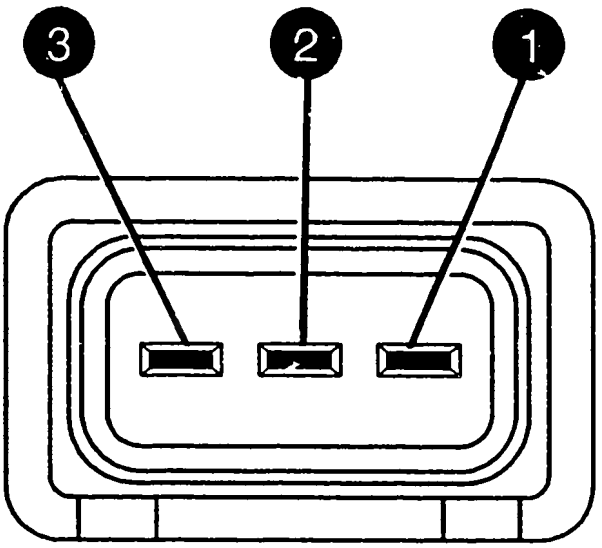
KMK01537

POTENTIOMETER ADJUSTMENT
* Pump with 3rd part-load delivery stop

Contact 1 = Ground
Contact 2 = Tap
Contact 3 = Positive terminal

Apply DC voltage as per test-specification sheet to plug contact 3 (+) and plug contact 1 (ground).
Connect up voltmeter to plug contacts 1 and 2.
Set desired voltage (as per test-specification sheet) by turning potentiometer housing.

Continue: H08/1 Fig.: J08/2



KMK01538

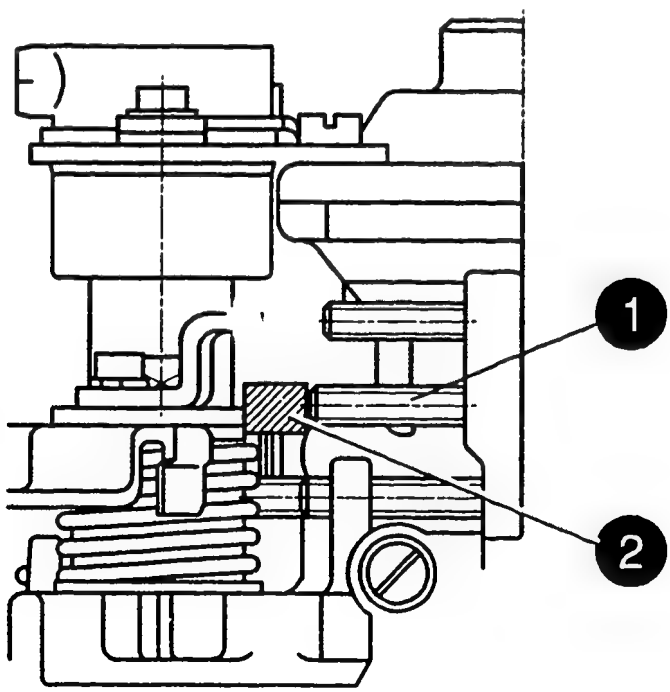
POTENTIOMETER ADJUSTMENT
* Pump with 3rd and 4th part-load delivery stop

1 = Adjusting screw, 3rd stop
2 = Spacer

ADJUSTING-PART LOAD DELIVERY

Insert spacer 12.0 mm at 3rd stop between control lever and part-load stop screw.
Position control lever against spacer.
Approach speed for part-load delivery at 3rd stop.
Set delivery by way of adjusting screw.

Continue: J10/1 Fig.: J09/2



KMK02984

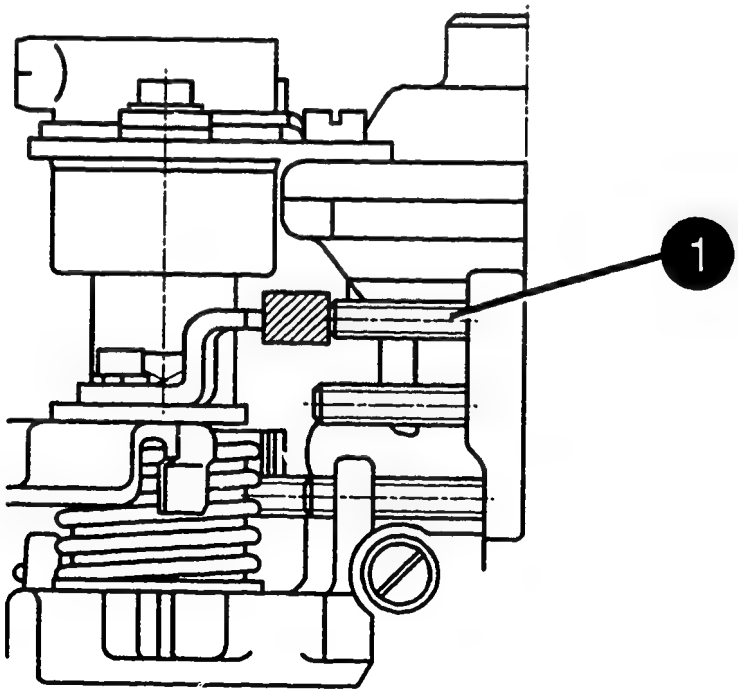
POTENTIOMETER ADJUSTMENT
* Pump with 3rd and 4th part-load delivery stop

1 = Adjusting screw, 4th stop

Insert spacer 12.0 mm at 4th stop between control lever and part-load stop screw.

Position control lever against spacer.
Approach speed for part-load delivery at 4th stop.
Adjust delivery by way of adjustment screw.

Continue: J11/1 Fig.: J10/2



KMK01540

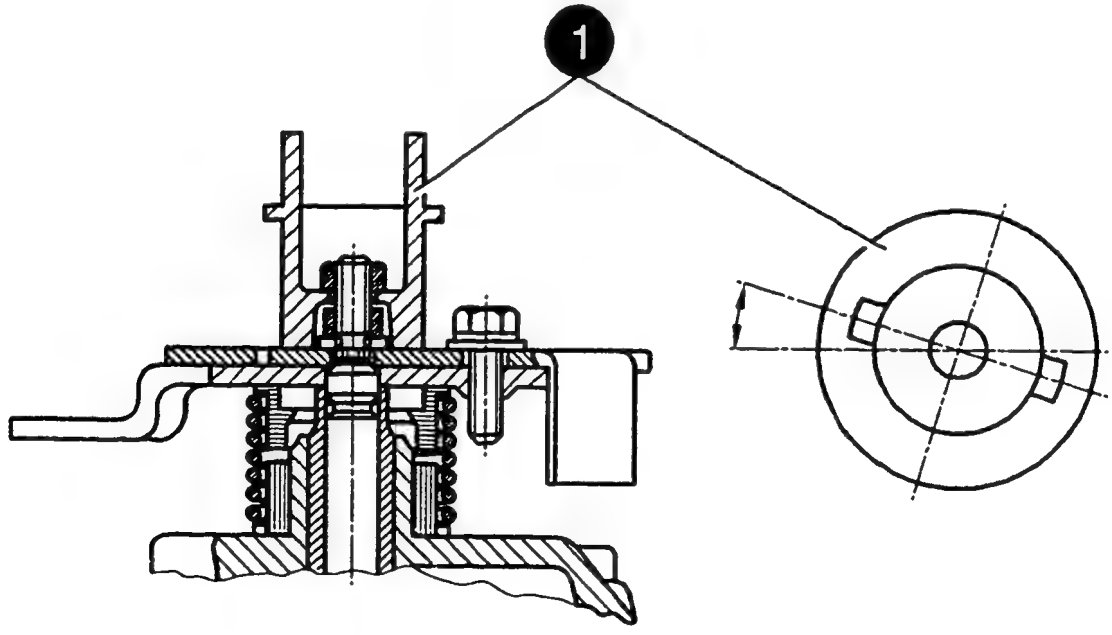
POTENTIOMETER ADJUSTMENT

1 = Driver

Prerequisite:
Pump (including 3rd and 4th stop) set

Position driver on adjustment shaft and align with angle gauge to 25° (refer to test-specification sheet under remarks for deviation).
Tighten driver to prescribed torque.
Install potentiometer, slightly tighten mounting plate.

Continue: J12/1 Fig.: J11/2



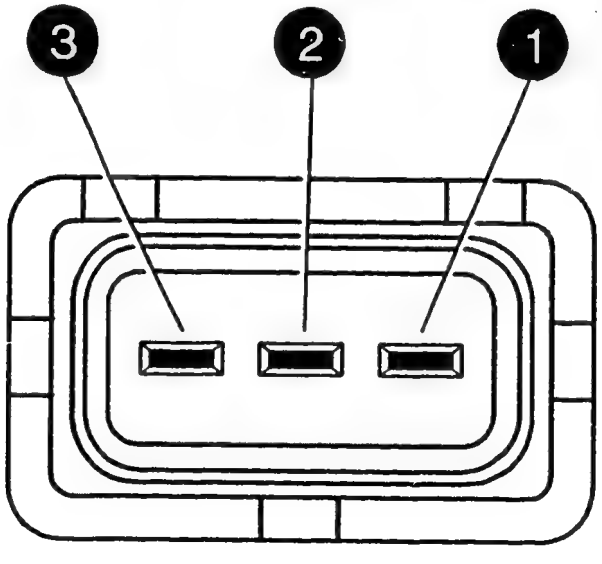
KMK01541

POTENTIOMETER ADJUSTMENT

Contact 1 = Ground
Contact 2 = Tap
Contact 3 = Positive terminal

Apply DC voltage as per test-specification sheet to plug contact 3 (+) and plug contact 1 (ground).
Connect up voltmeter to plug contacts 1 and 2.
Position speed-control lever with spacer 12 mm against 3rd part-load delivery stop.
Set desired voltage by turning potentiometer housing.

Continue: J13/1 Fig.: J12/2



KMK01542

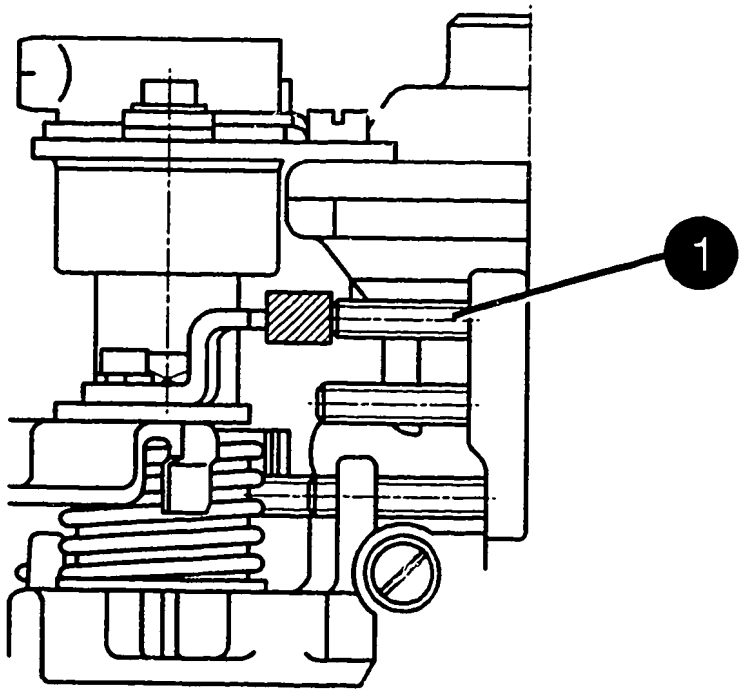
POTENTIOMETER ADJUSTMENT
* Pump with 3rd and 4th part-load delivery stop.

1 = 4th part-load delivery stop

Tighten mounting plate to prescribed tightening torque.
Check adjustment again.

Position speed-control lever with spacer 12.0 mm against 4th part-load delivery stop.
Nominal voltage must be obtained in this control lever position.

Continue: J14/1 Fig.: J13/2



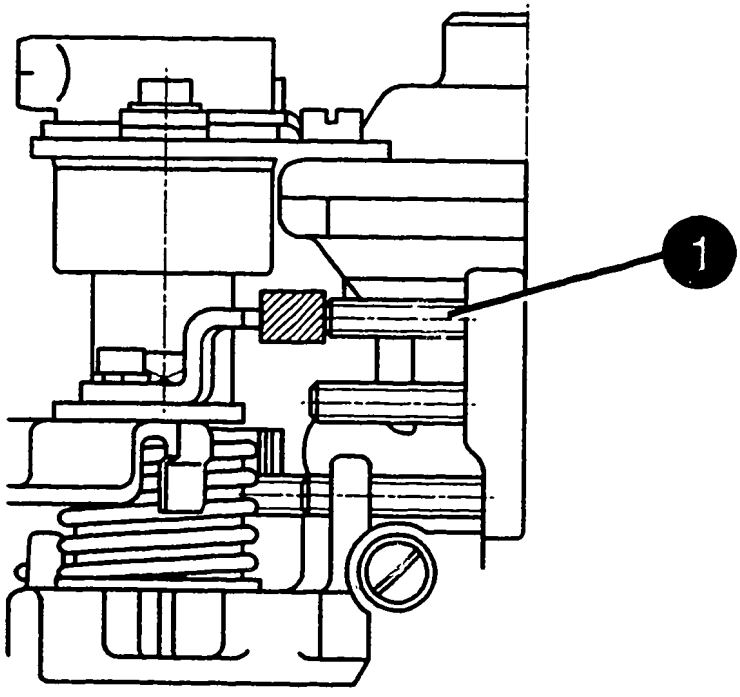
KMK01540

POTENTIOMETER ADJUSTMENT

* Pump with 3rd and 4th part-load delivery stop.

If set value is not attained, turn potentiometer in value range.
If set values are not attained, install replacement potentiometer (calibrated potentiometer) as per service-parts list.

Continue: H08/1



KMK01540

MICROSWITCH ADJUSTMENT

Following adjustment sequence only applies to VE pumps W I T H potentiometer and 3rd part-load delivery stop

Prerequisite:
Pump completely adjusted.
Fit stop plate.
Attach microswitch.

Continue: J16/1

MICROSWITCH ADJUSTMENT
* Pump with potentiometer

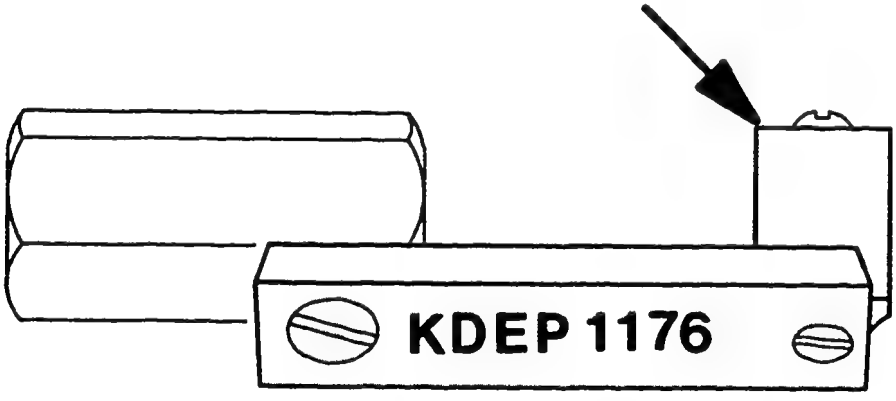
Arrow = Spacer 11.8 mm

ADJUSTMENT INSTRUCTIONS:

Press speed-control lever with auxiliary spring aginst spacer.

Remove necessary spacer from range spacer KDEP 1176.
Use feeler gauge to effect compensation for difference with respect to indicated dimensions.

Continue: J17/1 Fig.: J16/2



KMK01530

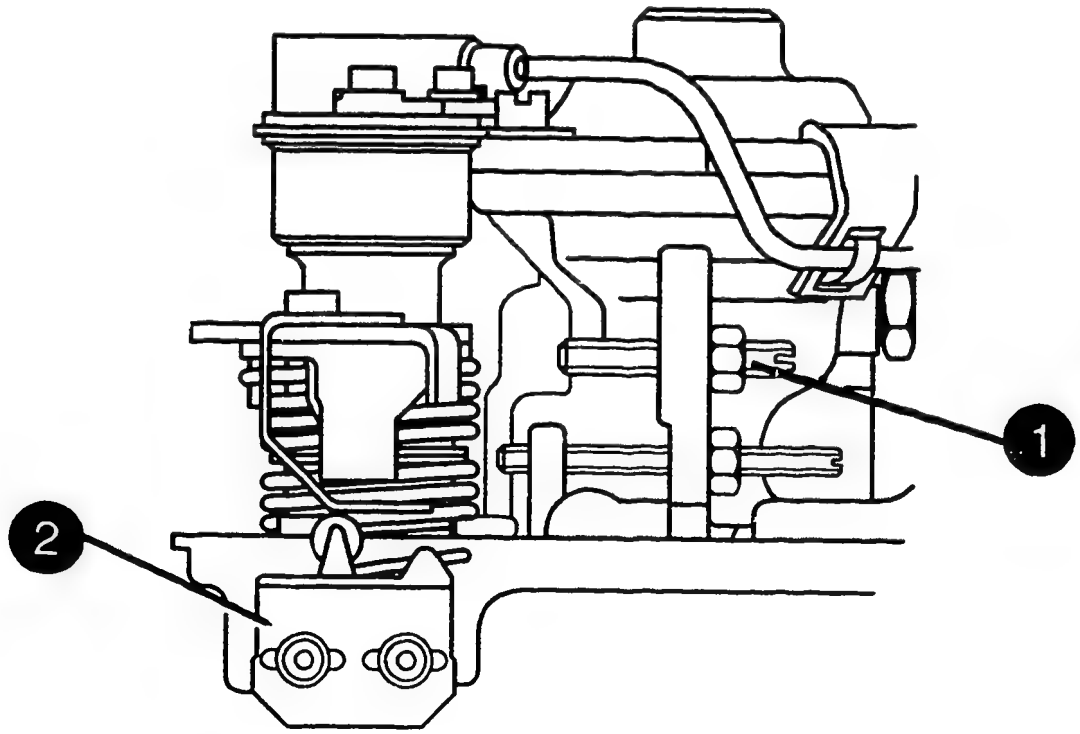
MICROSWITCH ADJUSTMENT
* Pump with potentiometer

1 = 3rd part-load delivery stop
2 = Microswitch

Press speed-control lever with spacer 12 mm against 3rd part-load delivery stop.

Approach speed for part-load delivery and set delivery rate.

Continue: J18/1 Fig.: J17/2

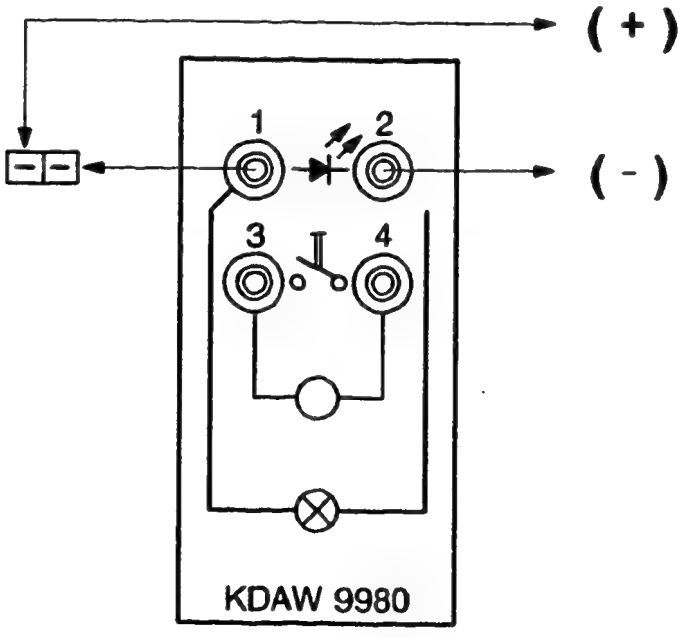


KMK01531

MICROSWITCH ADJUSTMENT
* Pump with potentiometer

Use KDAW 9980 for switching-point adjustment.
Connect up KDAW 9980 as follows.
Connect socket 2 of KDAW to negative connection of stabilizer.
Connect socket 1 of KDAW to plug contact of pump.
Apply supply voltage of 12 Volt to plug contact.

Continue: J19/1 Fig.: J18/2



KMK01532

MICROSWITCH ADJUSTMENT
* Pump with potentiometer

SWITCHING POINT ADJUSTMENT
Shift microswitch until light-emitting diode goes out.
Fix microswitch in this position with fastening screws.

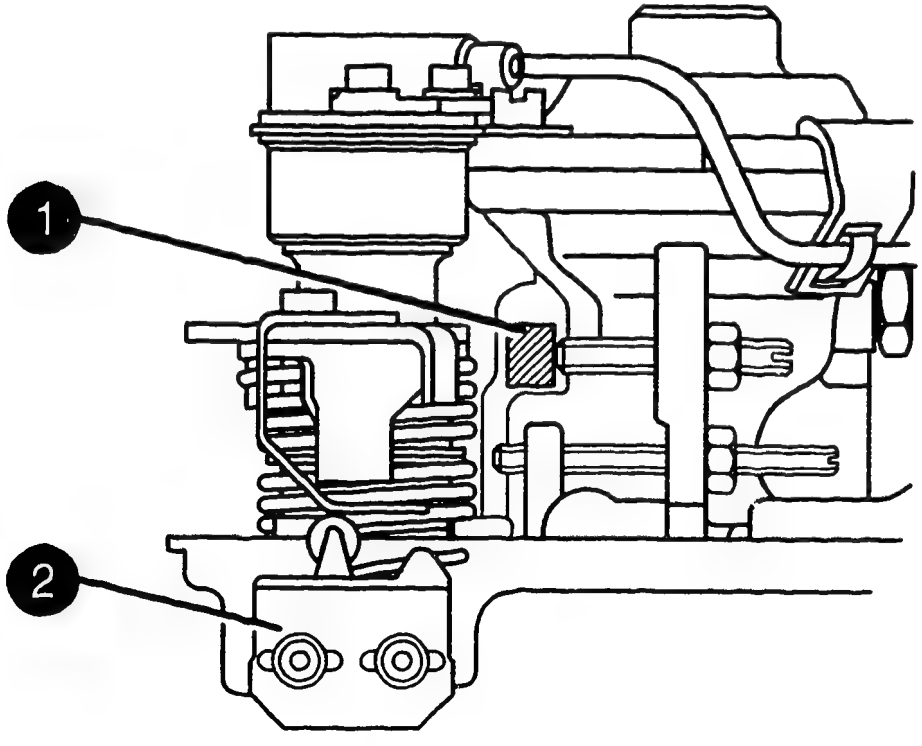
Continue: J20/1

MICROSWITCH ADJUSTMENT
* Pump with potentiometer
1 = Spacer
2 = Microswitch

CHECKING SWITCHING-POINT SETTING

Press speed-control lever with spacer 12.2 mm against 3rd part-load delivery stop. Connect up KDAW 9980.
Microswitch must not switch in this lever position.
Light-emitting diode on.
Fit spacer 11.8 mm.
Light-emitting diode off.
Adjust microswitch if switching points are not obtained.

Continue: H08/1 Fig.: J20/2



KMK01533

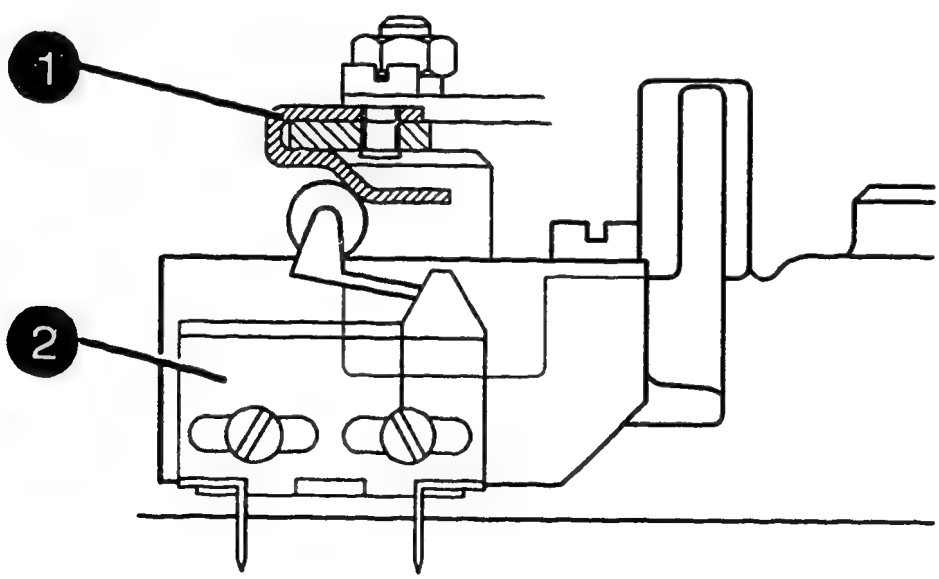
MICROSWITCH ADJUSTMENT
Pump with no potentiometer and
3rd part-load delivery stop

1 = Stop plate
2 = Microswitch

Prerequisite:
Pump completely adjusted.

Fit stop plate.
Attach microswitch.
Position speed-control lever with
spacer as per test-specification sheet
against residual-quantity adjusting
screw/idle stop.

Continue: J22/1 Fig.: J21/2

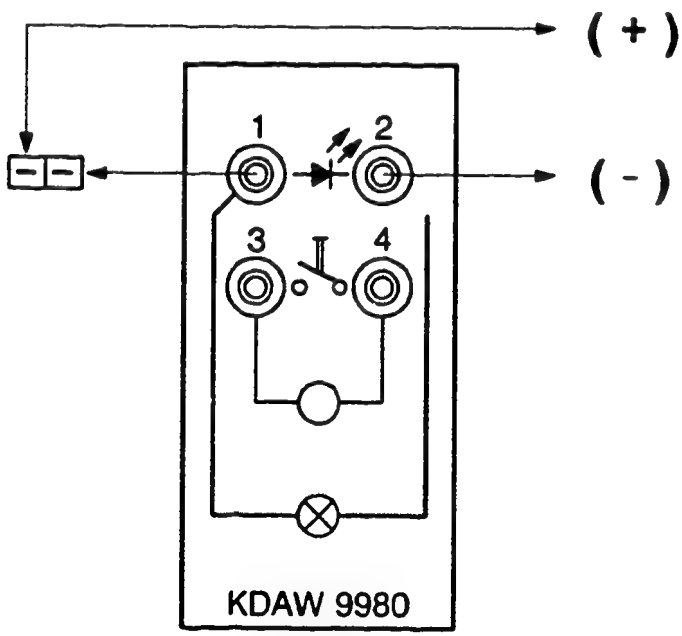


KMK01534

MICROSWITCH ADJUSTMENT
Pump with no potentiometer and 3rd part-load delivery stop

Use KDAW 9980 for switching-point adjustment.
Connect up KDAW 9980 as follows to microswitch plug.
Connect up socket 2 of KDAW to negative connection of stabilizer.
Connect up socket 1 to plug contact or microswitch.
Apply supply voltage 12 V.
Move microswitch as far as switching point.
Diode lights.

Continue: J23/1 Fig.: J22/2



KMK01532

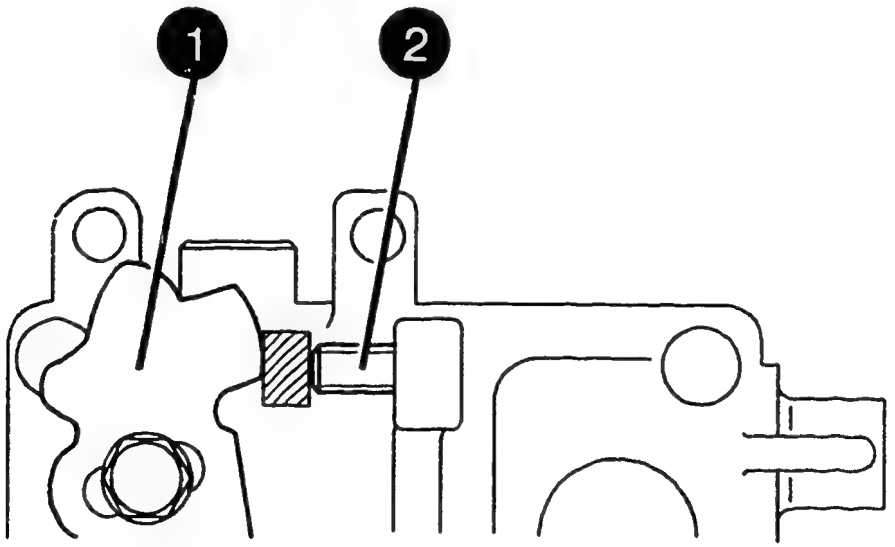
MICROSWITCH ADJUSTMENT
Pump with no potentiometer and 3rd part-load delivery stop

1 = Speed-control lever
2 = Residual-quantity stop screw

CHECKING MICROSWITCH ASSIGNMENT

Place spacer 12.4 mm between speed-control lever and residual-quantity stop screw.
Light-emitting diode off

Continue: J24/1 Fig.: J23/2



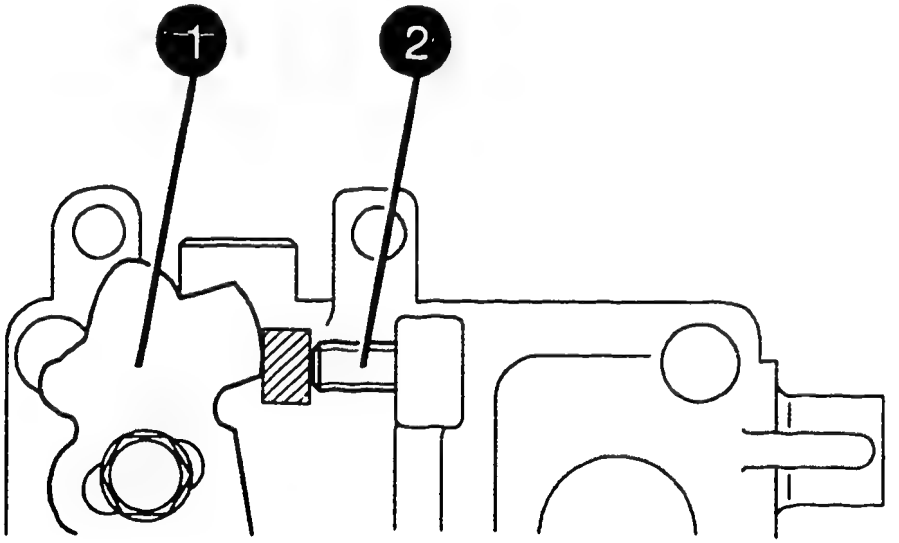
KMK01535

MICROSWITCH ADJUSTMENT
Pump with no potentiometer and
3rd part-load delivery stop

1 = Speed-control lever
2 = Residual-quantity stop screw

Fit spacer 11.6 mm between
speed-control lever and
residual-quantity stop screw.
NOTE: KDEP 1189 = 10.8 mm
Compensate for difference.
Light-emitting diode on

Continue: J25/1 Fig.: J24/2



KMK01535

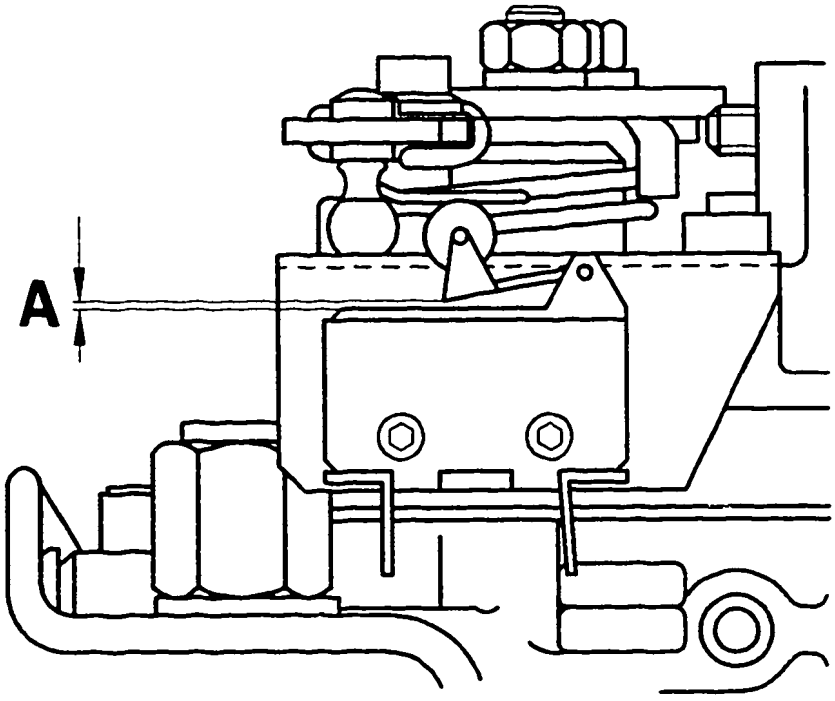
MICROSWITCH ADJUSTMENT
Pump with no potentiometer and 3rd part-load delivery stop

CHECKING MICROSWITCH RESIDUAL TRAVEL

Position speed-control lever against rated-speed stop.
Measure gap.

Refer to "Remarks" on test-specification sheet for adjustment dimension.

Continue: H08/1 Fig.: J25/2



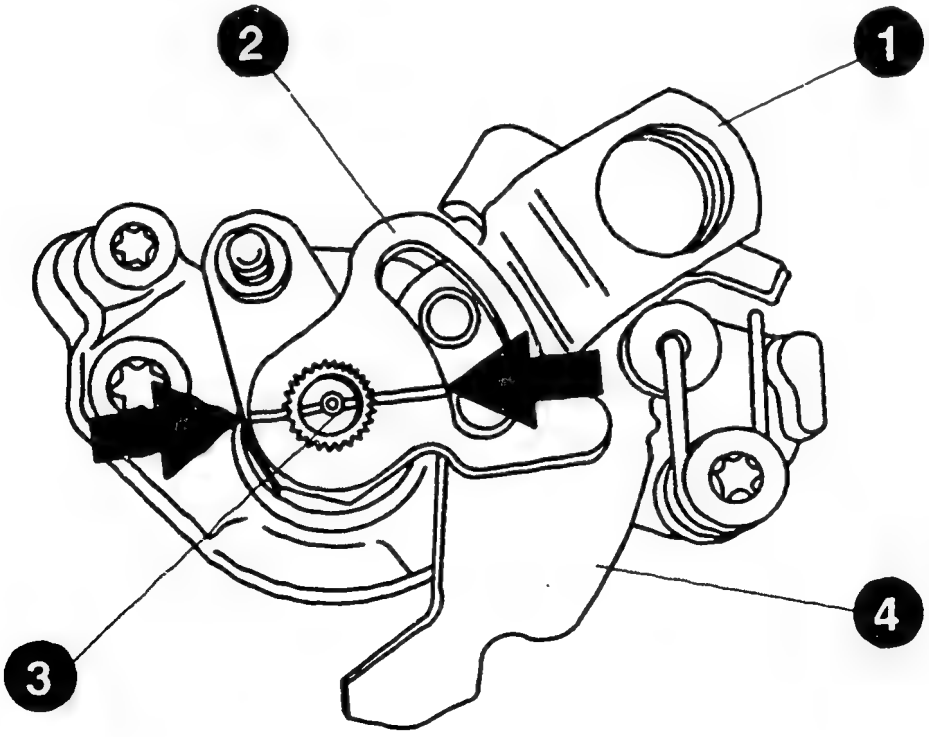
KMK01536

ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV-KSB)

1 = KSB control lever
2 = Basic lever
3 = Lever shaft
4 = Bell crank

Place KSB control lever on lever shaft and position bell crank against housing stop (housing stop not visible in picture).
Position basic lever with mark on lever shaft toothing such that the two marks coincide (arrows).

Continue: J27/1 Fig.: J26/2



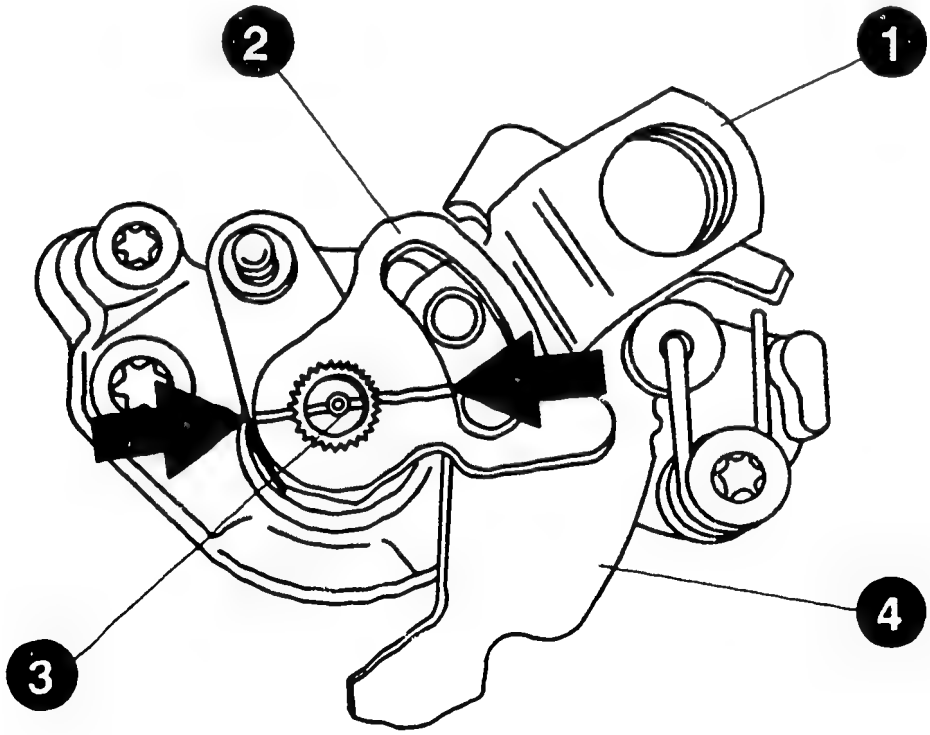
KMK02985

ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV–KSB)

1 = KSB control lever
2 = Basic lever
3 = Lever shaft
4 = Bell crank

Turn basic lever until tapped hole makes contact with end of slot.
Screw in cheese–head bolt (do not tighten).
Place spring washer and plain washer on lever shaft.
Press down plain washer and fit lock washer.

Continue: J28/1 Fig.: J27/2



KMK02985

ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV-KSB)

* Determine KSB start of stroke

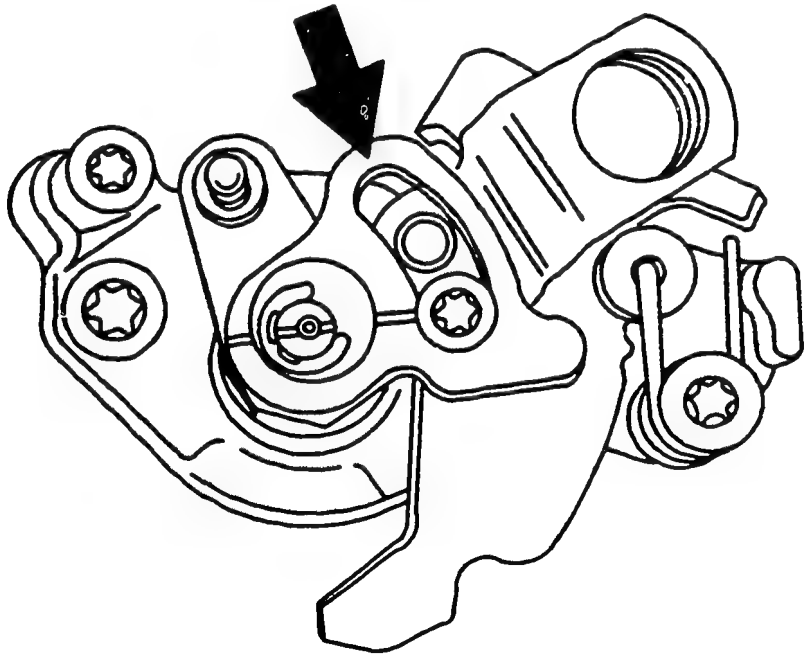
Arrow = Basic lever

Fix KSB control lever in 2nd detent position.
Turn basic lever until pressure point (start of stroke) is reached.

Fix basic lever in this position.

Tighten fashtening screw to 8...12 Nm.

Continue: K01/1 Fig.: J28/2



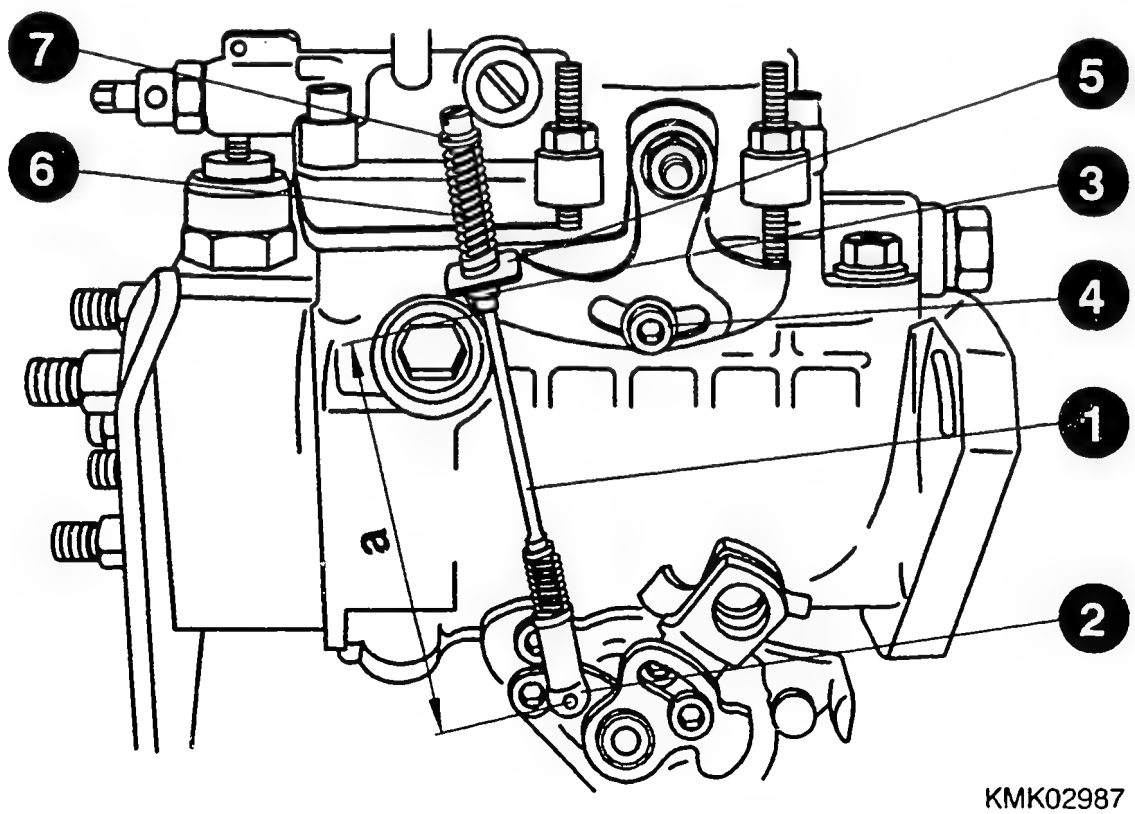
KMK02986

ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV-KSB)

1 = Guide rod
2 = Lock washer
3 = Stop ring
4 = Fastening screw, LFG lever

Set guide rod to dimension "a" = 90.5 +0.5 mm.
Loosen fastening screw at LFG stop lever.
Slip stop ring onto guide rod and insert through hole in LFG stop lever.

Continue: K02/1 Fig.: K01/2



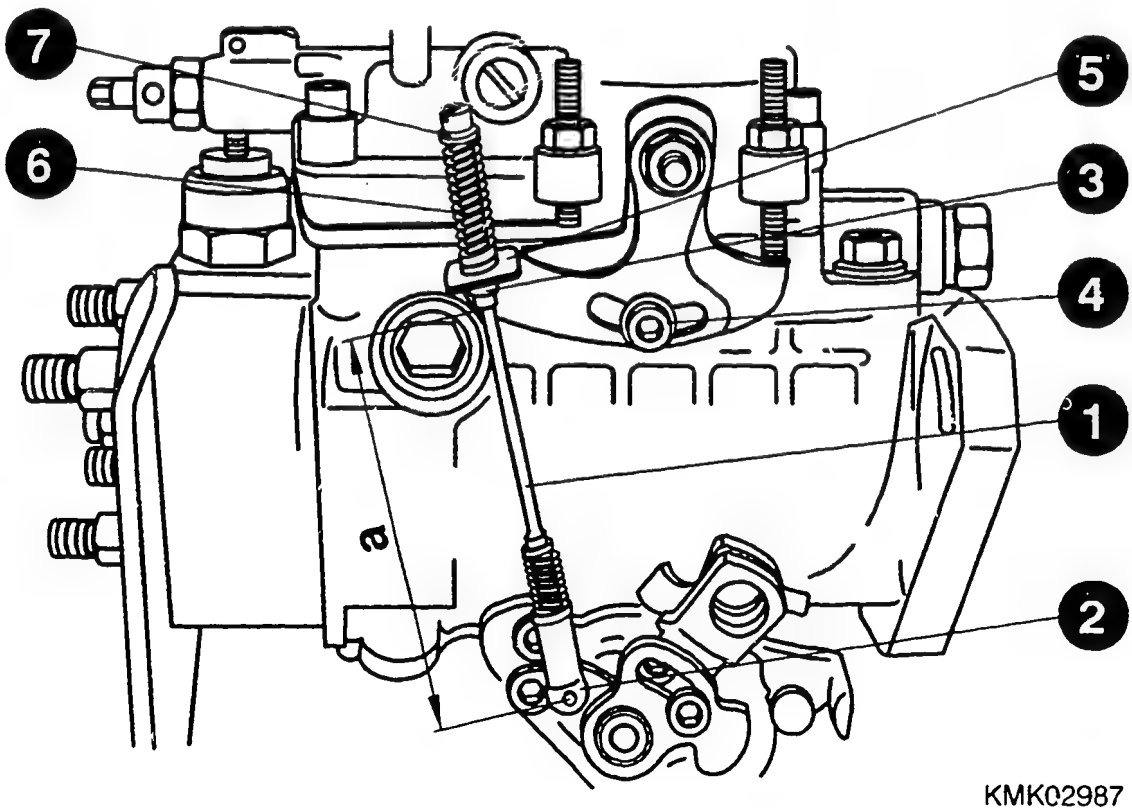
ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV-KSB)

5 = Support ring
6 = Pressure spring
7 = Guide sleeve

Fit guide rod with lock washer onto KSB control lever.

Fit support ring and pressure spring onto guide rod and mount guide sleeve.

Continue: K03/1 Fig.: K02/2



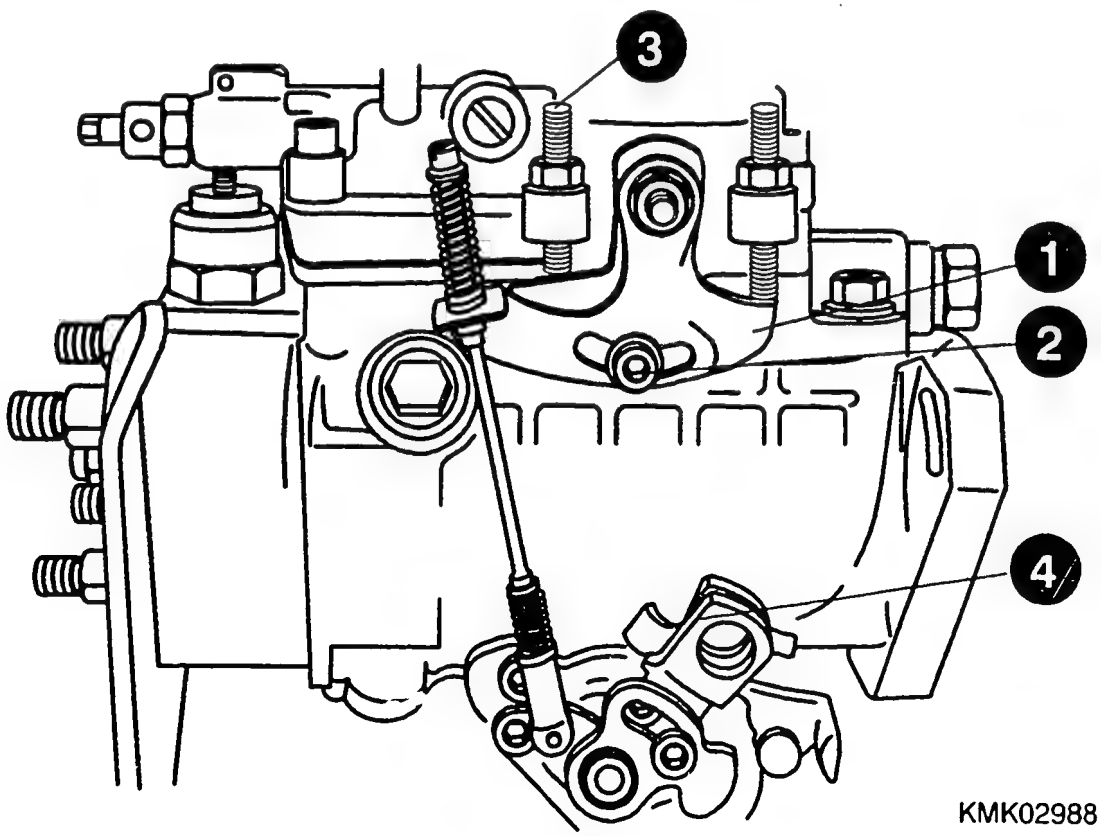
KMK02987

ASSIGNMENT OF LFG STOP LEVER TO TIMING DEVICE KSB (SV-KSB)

1 = LFG stop lever
2 = Fastening screw, LFG lever
3 = Idle-speed adjusting screw
4 = Bell crank

Position KSB control lever against housing stop (housing stop is located behind bell crank).
Position LFG stop lever against idle-speed adjusting screw.
Tighten fastening screw at LFG lever to 2...3 Nm in this position.
Screw out idle-speed adjusting screw by 2 turns (2 mm).

Continue: H08/1 Fig.: K03/2



CHECKING AND ADJUSTING SPHERICAL BOLT SPACING FOR HYDRAULIC DAMPER

* Pump with SV-KSB coupled with LFG

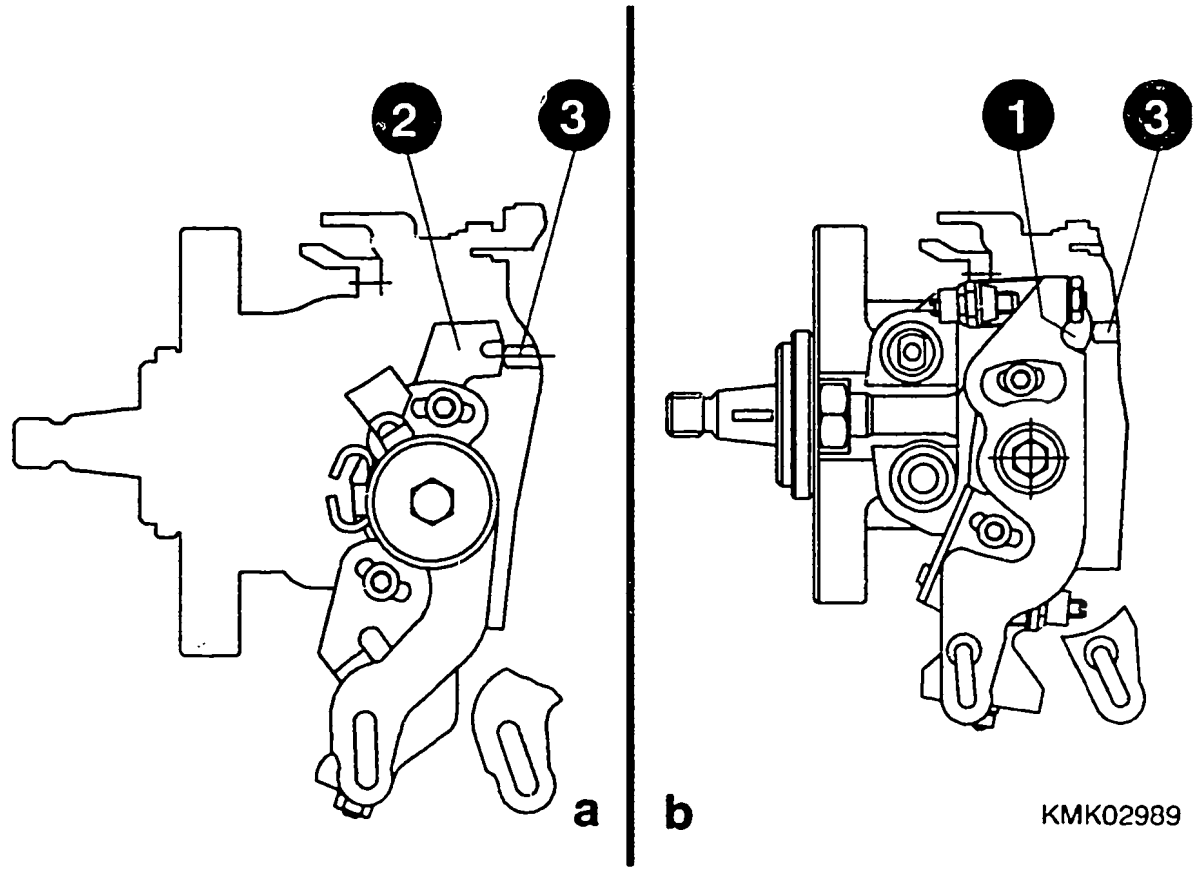
1 = Intermediate lever (MLD)
2 = Adjusting lever (FLD)
3 = Residual-quantity stop screw

Prerequisite:
Intermediate lever or adjusting lever positioned against residual-quantity stop screw.

Measure distance between center of spherical bolt at intermediate lever and center of spherical bolt at mounting bracket.

Picture a = Pump with FLD
Picture b = Pump with MLD

Continue: K05/1 Fig.: K04/2



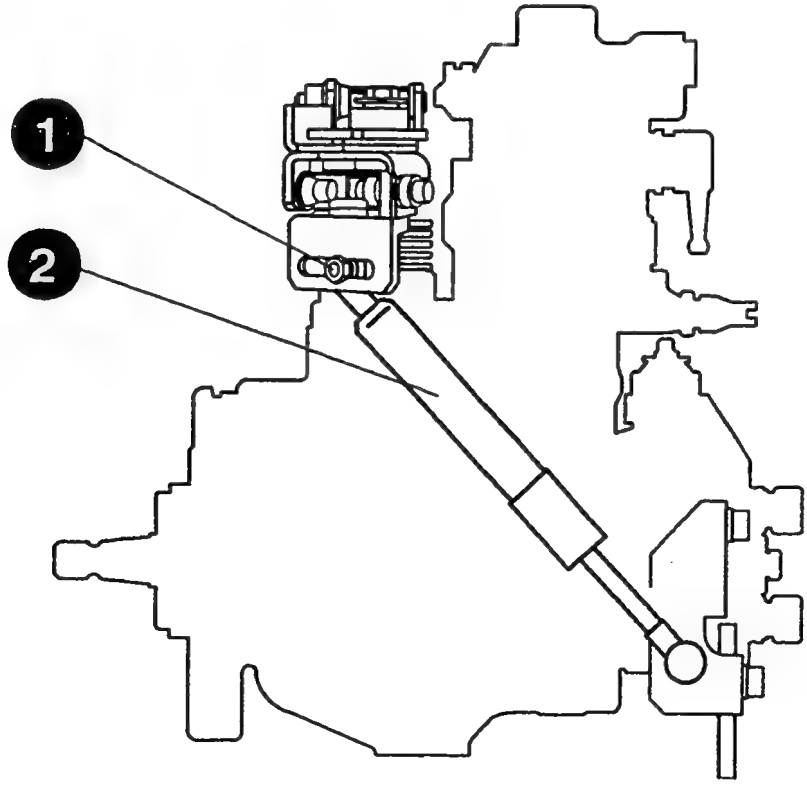
CHECKING AND ADJUSTING SPHERICAL BOLT SPACING FOR HYDRAULIC DAMPER
* Pump with SV-KSB coupled with LFG

1 = Spherical bolt
2 = Hydraulic damper

Set value:
- Mechanical power on/off damper
  167 +- 1.0 mm
- Spring-actuated power on/off damper
  174 +- 1.0 mm

Adjust spherical bolt in slot area if necessary.
Engage hydraulic damper in correct position.

Continue: K06/1 Fig.: K05/2



KMKC2990

CHECKING AND ADJUSTING SPHERICAL BOLT SPACING FOR HYDRAULIC DAMPER

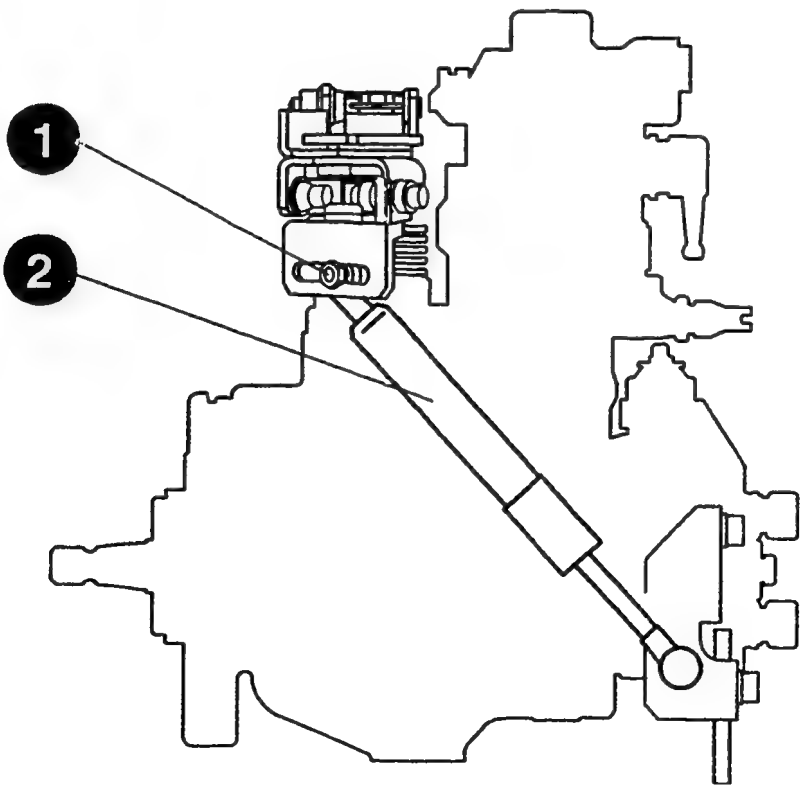
* Pump with SV-KSB coupled with LFG

1 = Spherical bolt
2 = Hydraulic damper

Engage hydraulic damper between spherical bolt at intermediate lever/adjusting lever and at mounting bracket.

Residual-quantity setting must not be influenced.

Continue: H08/1 Fig.: K06/2



KMK02990

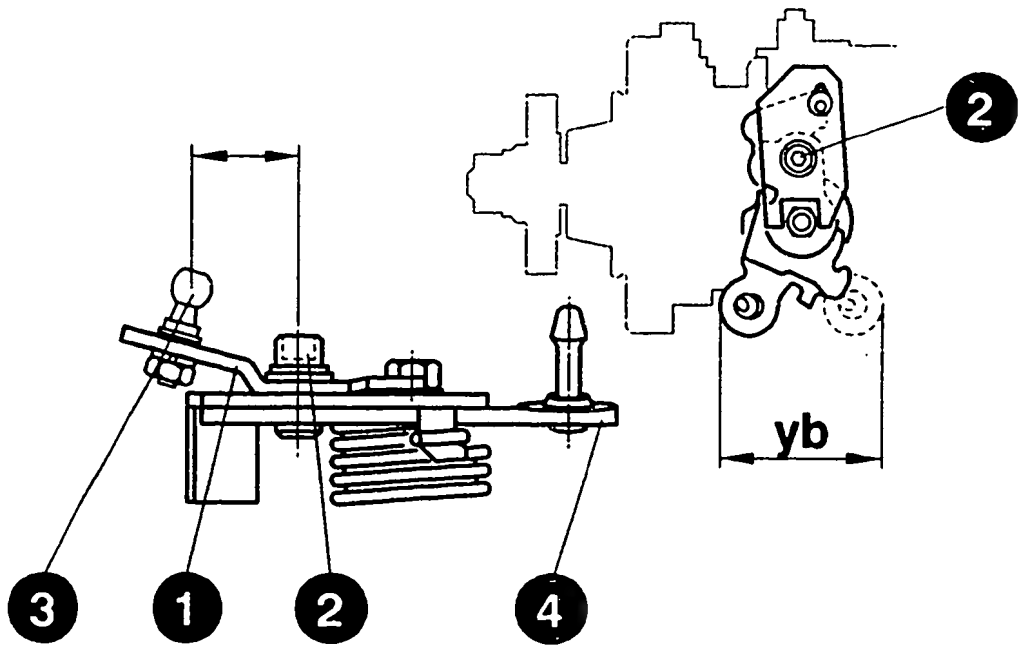
ATTACHING LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

* Pump with vacuum control valve

1 = Lever of spring-actuated power on/off damper
2 = Fastening screw
3 = Spherical bolt
4 = Speed-control lever

Attach lever as per service-parts list to speed-control lever.
Position speed-control lever against rated-speed stop starting from idle.
Measure adjustment-travel dimension Yb.

Continue: K08/1 Fig.: K07/2



KMK 02991

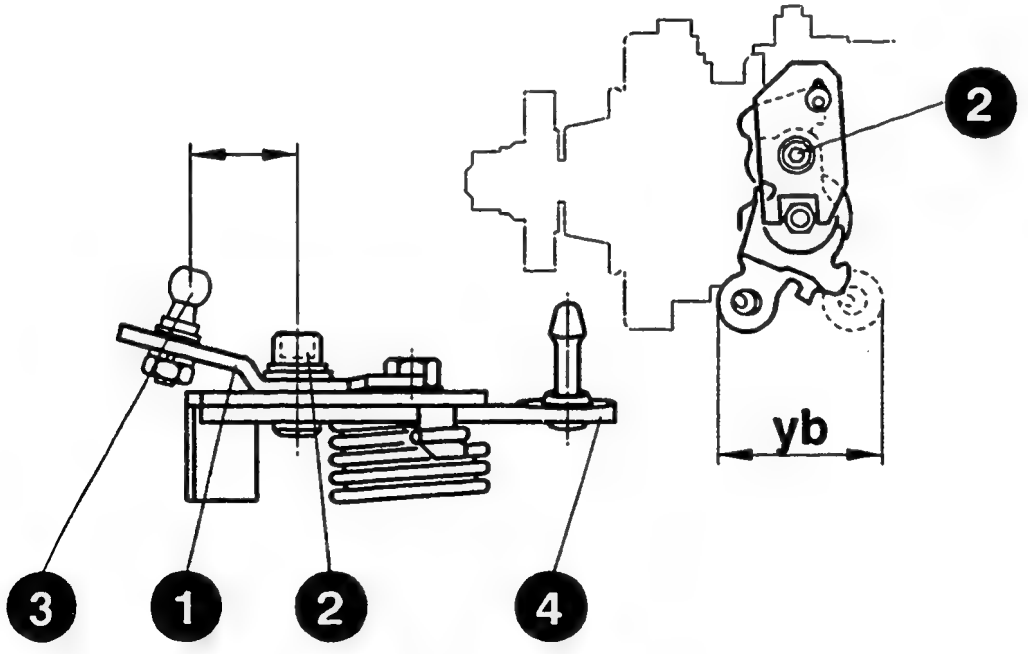
ATTACHING LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

* Pump with vacuum control valve

1 = Lever of spring-actuated power on/off damper
2 = Fastening screw
3 = Spherical bolt
4 = Speed-control lever

Measure distance between center of ball stud and center of fastening screw and adjust in line with dimension Yb.
Adjustment dimensions for ball stud in test-specification sheet.
Tightening torque, ball stud 3...5 Nm.

Continue: H08/1 Fig.: K08/2



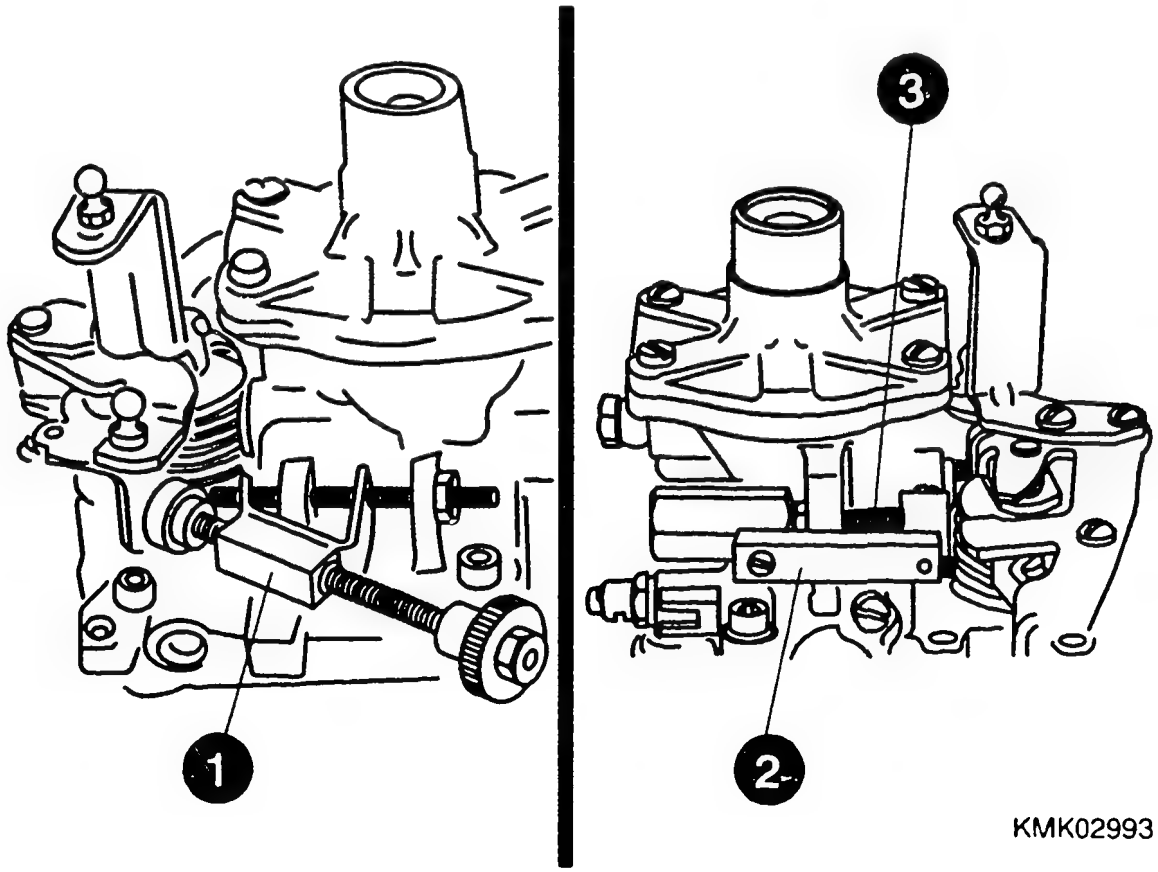
KMK 02991

ADJUSTING EGR PART-LOAD STOP
* Pump with HBA

1 = Adjustment screw
2 = Range spacer
3 = Adjusting screw, part-load stop

Insert adjustment screw KDEP 1177 between speed-control lever and rated-speed adjusting screw.
Slip range spacer KDEP 1177 with spacing dimension 11.8 mm onto adjusting screw, part-load delivery stop.
Make up difference with respect to adjustment dimension (in accordance with test-specification sheet).

Continue: K10/1 Fig.: K09/2



KMK02993

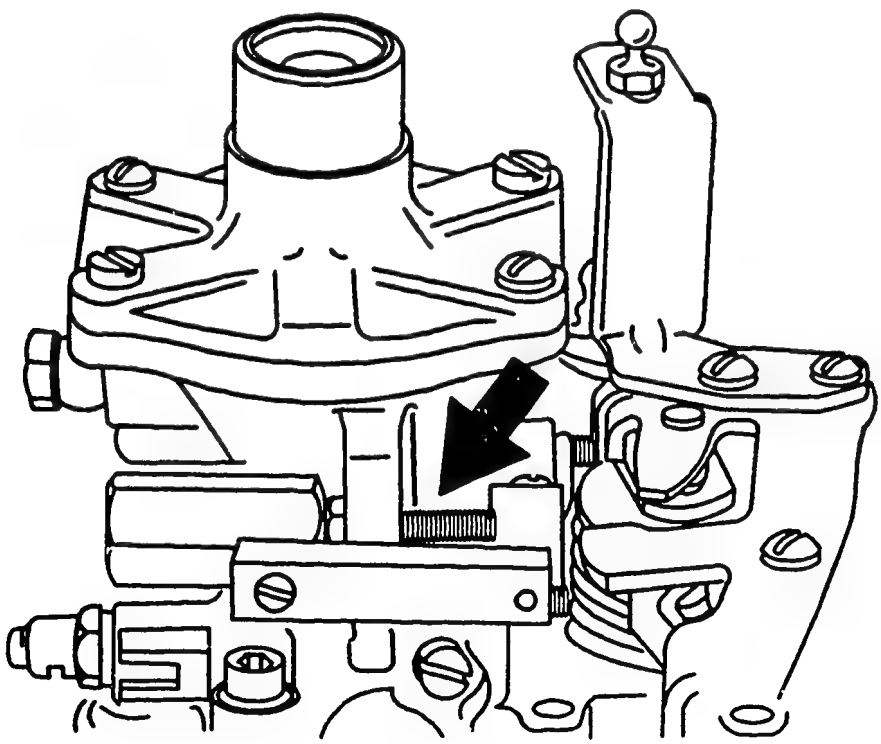
ADJUSTING EGR PART-LOAD STOP
* Pump with HBA

Arrow = Adjusting screw, part-load delivery

Position speed-control lever via knurled screw against range spacer.

Approach part-load-delivery speed and adjust delivery at adjusting screw, part-load delivery.

Continue: H08/1 Fig.: K10/2



KMK02992

ADJUSTING TEMPERATURE-CONTROLLED KSB WITH IDLE INCREASE ACTING ON ROLLER RING

* Pump with HBA

Prerequisite:
- Timing-device cover (original) attached on delivery end.
- Control housing fitted.

Turn pump plunger to bottom dead center.

Continue: K12/1

ADJUSTING TEMPERATURE-CONTROLLED KSB WITH IDLE INCREASE ACTING ON ROLLER RING

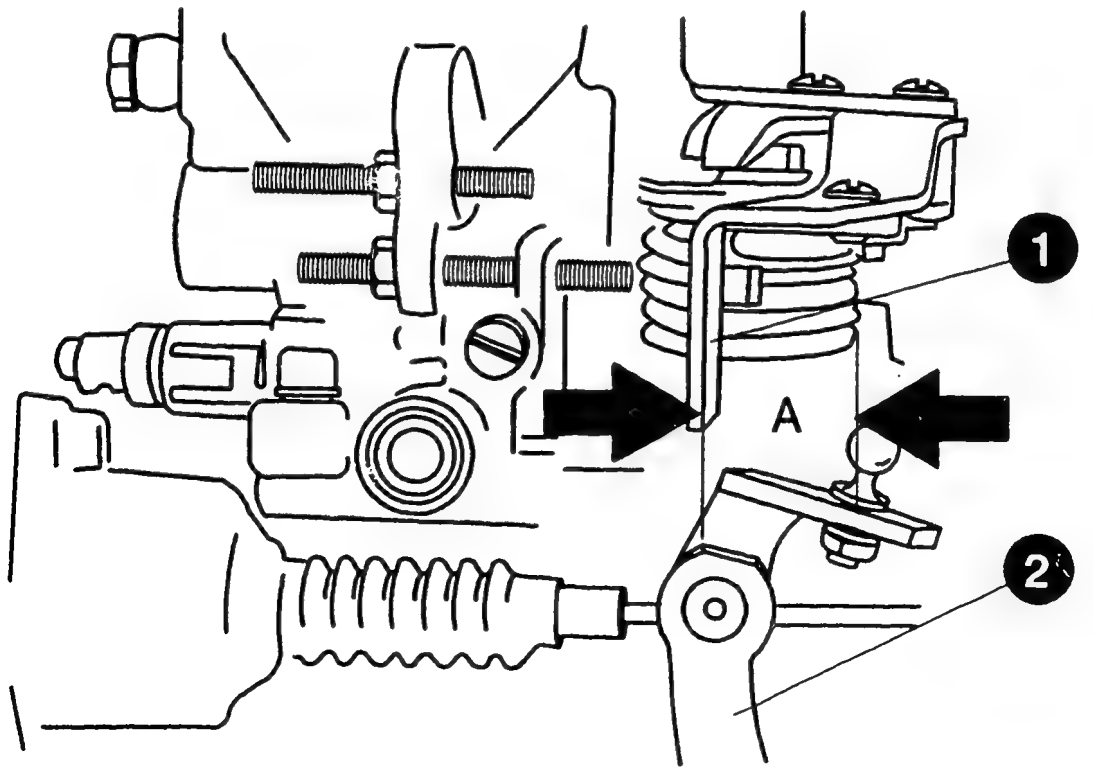
* Pump with HBA

1 = Speed-control lever
2 = KSB control lever

Move KSB control lever in direction of control housing as far as pressure point. Measure distance "A" between spherical bolt and speed-control lever.
Set value: 13.7 mm
(refer to test-specification sheet for deviations).

Adjust by moving spherical bolt in slot area.

Continue: K13/1 Fig.: K12/2



KMK02994

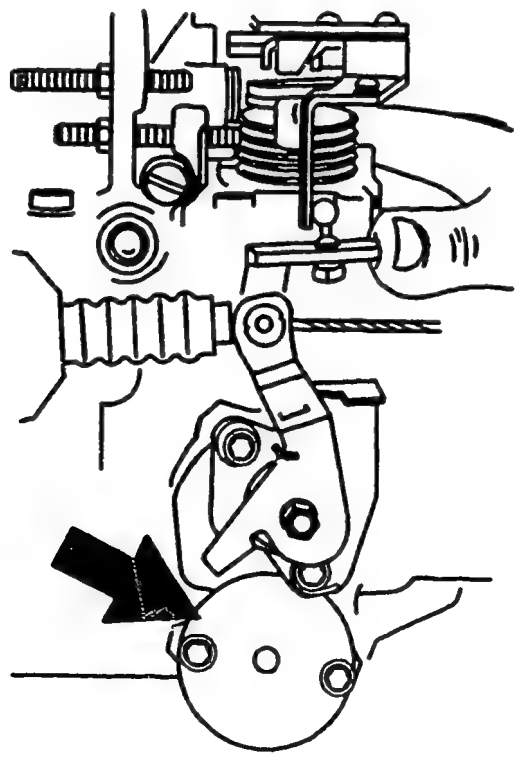
ADJUSTING TEMPERATURE-CONTROLLED KSB WITH IDLE INCREASE ACTING ON ROLLER RING

* Pump with HBA

Arrow = Timing-device cover
KDEP 1151

Remove timing-device cover (on delivery end).
Attach timing-device cover KDEP 1151 with 3 mm collar.
Adjust KSB control lever in control-cable plane in direction of control housing as far as pressure point.

Continue: K14/1 Fig.: K13/2



KMK02995

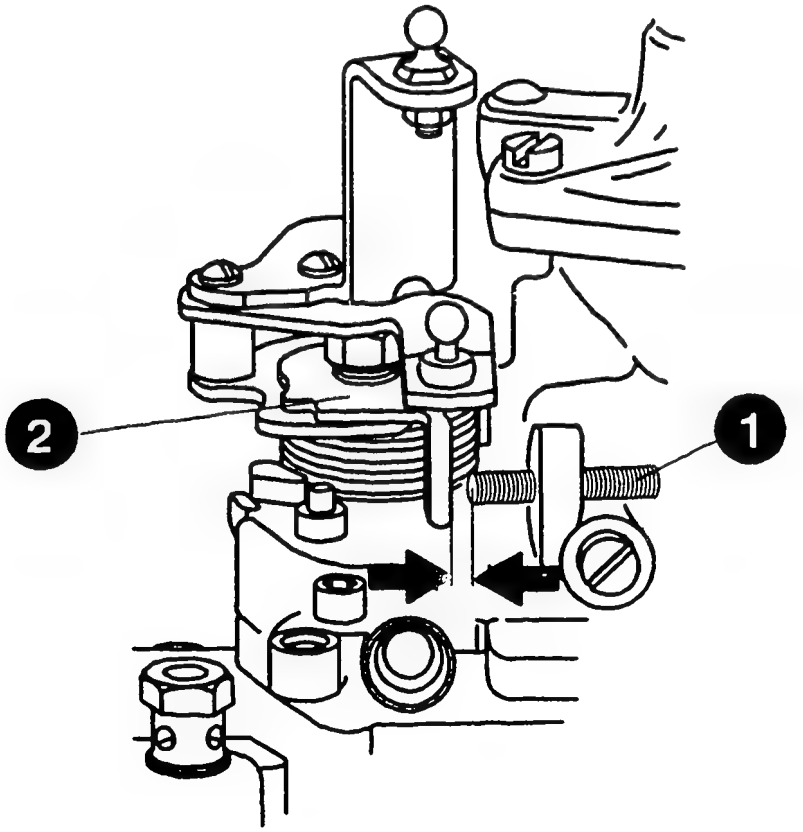
ADJUSTING TEMPERATURE-CONTROLLED KSB WITH IDLE INCREASE ACTING ON ROLLER RING

* Pump with HBA

1 = Idle stop screw
2 = Speed-control lever

There must be a spacing of 2.4..2.6 (2.2..2.8) mm in this position between idle stop screw and speed-control lever.
Fix control cable of control device with clamping screw and intermediate piece.

Continue: H08/1 Fig.: K14/2



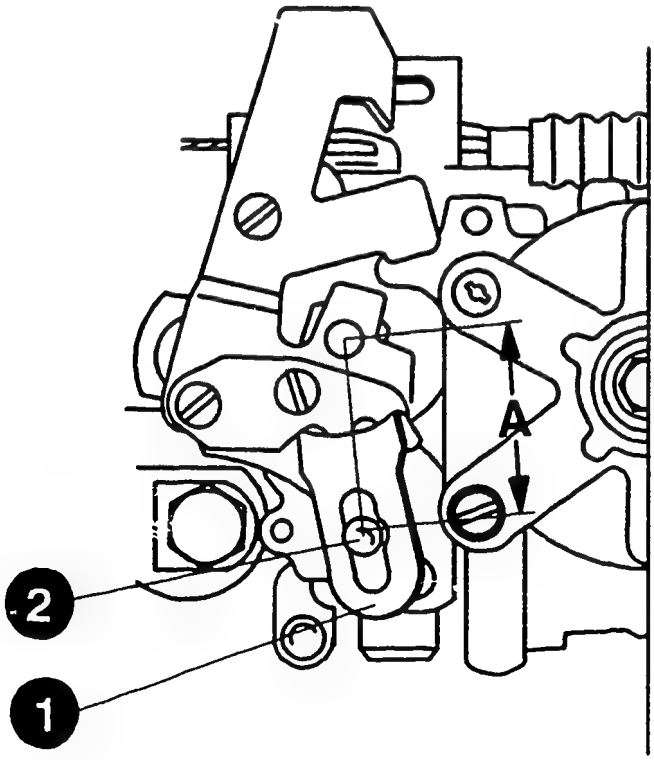
KMK02996

ASSIGNMENT OF BALL STUD AND SPEED-CONTROL LEVER TO LINKAGE, THROTTLE VALVE, EGR
* Pump with HBA

1 = Mounting bracket
2 = Ball stud

Position speed-control lever against idle stop.
Set ball stud to spacing "A" = 41 mm.
Measured from center of governor shaft to center of spherical bolt.

Continue: K16/1 Fig.: K15/2

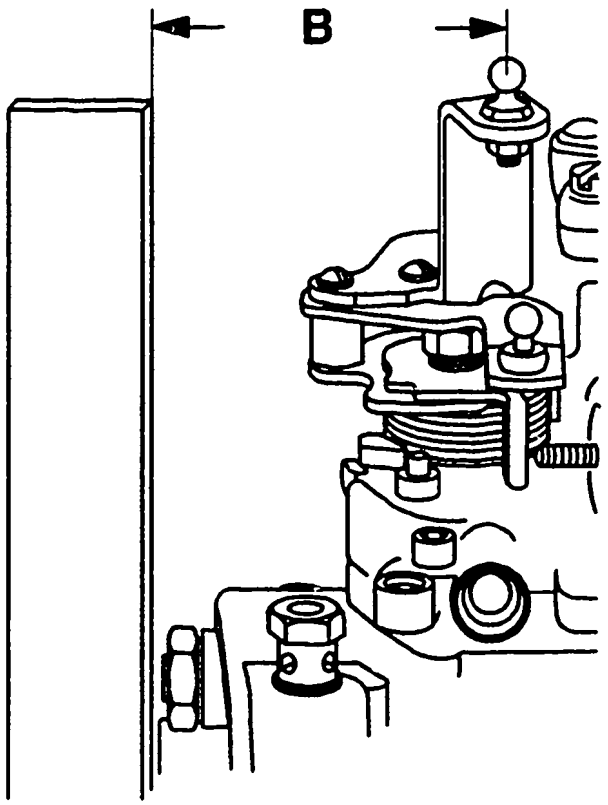


KMK02997

ASSIGNMENT OF BALL STUD AND SPEED–CONTROL LEVER TO LINKAGE, THROTTLE VALVE, EGR
* Pump with HBA

Measure distance between drive flange and center of ball stud at mounting bracket.
Spacing "B" = 66...74 mm.

Continue: K17/1 Fig.: K16/2



KMK02998

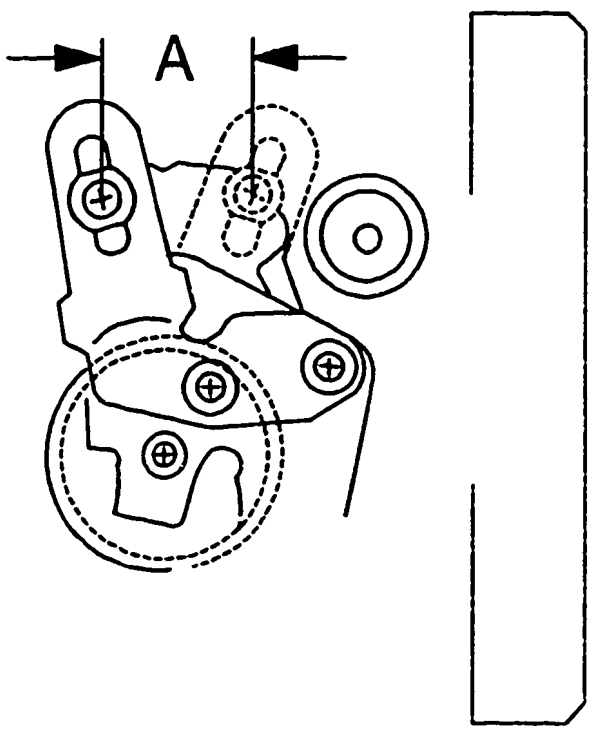
ASSIGNMENT OF BALL STUD AND SPEED–CONTROL LEVER TO LINKAGE, THROTTLE VALVE, EGR

* Pump with HBA

Position speed–control lever against rated–speed stop.
Measure adjustment travel "A" of ball stud from idle stop to rated–speed stop.

Adjustment travel "A" = 22.5...25.5 mm

Continue: H08/1 Fig.: K17/2



KMK02999

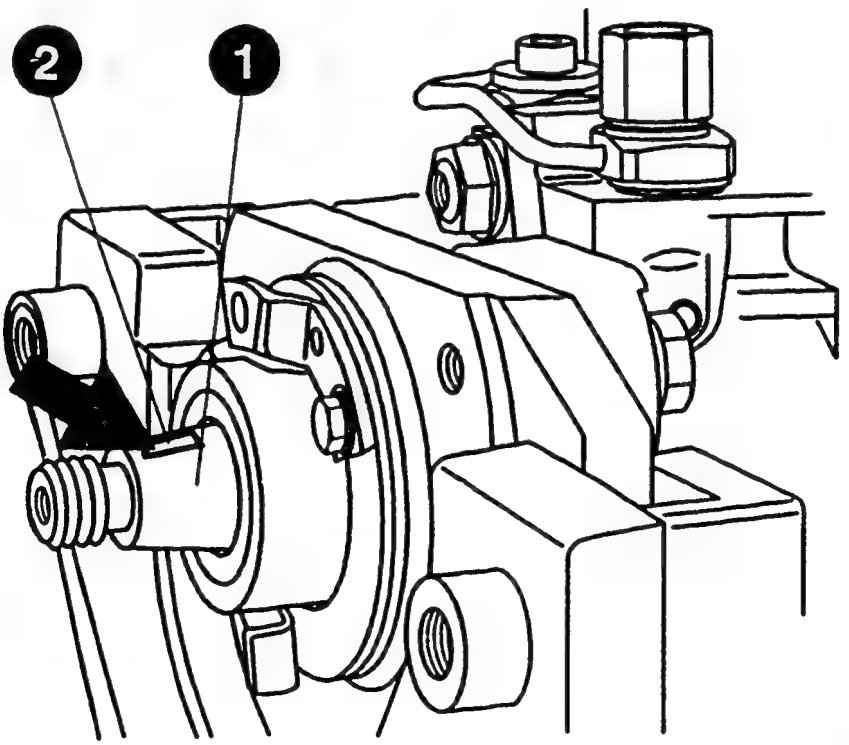
ADJUSTING START OF DELIVERY

Blocking of drive shaft without locking screw

1 = Taper
2 = Woodruff key

Remove drive coupling (test bench).
Clean tapered areas (grease/dirt-free).
When fitting coupling half, ensure that Woodruff key is in keyway (arrow).

Continue: K19/1 Fig.: K18/2



KMK03000

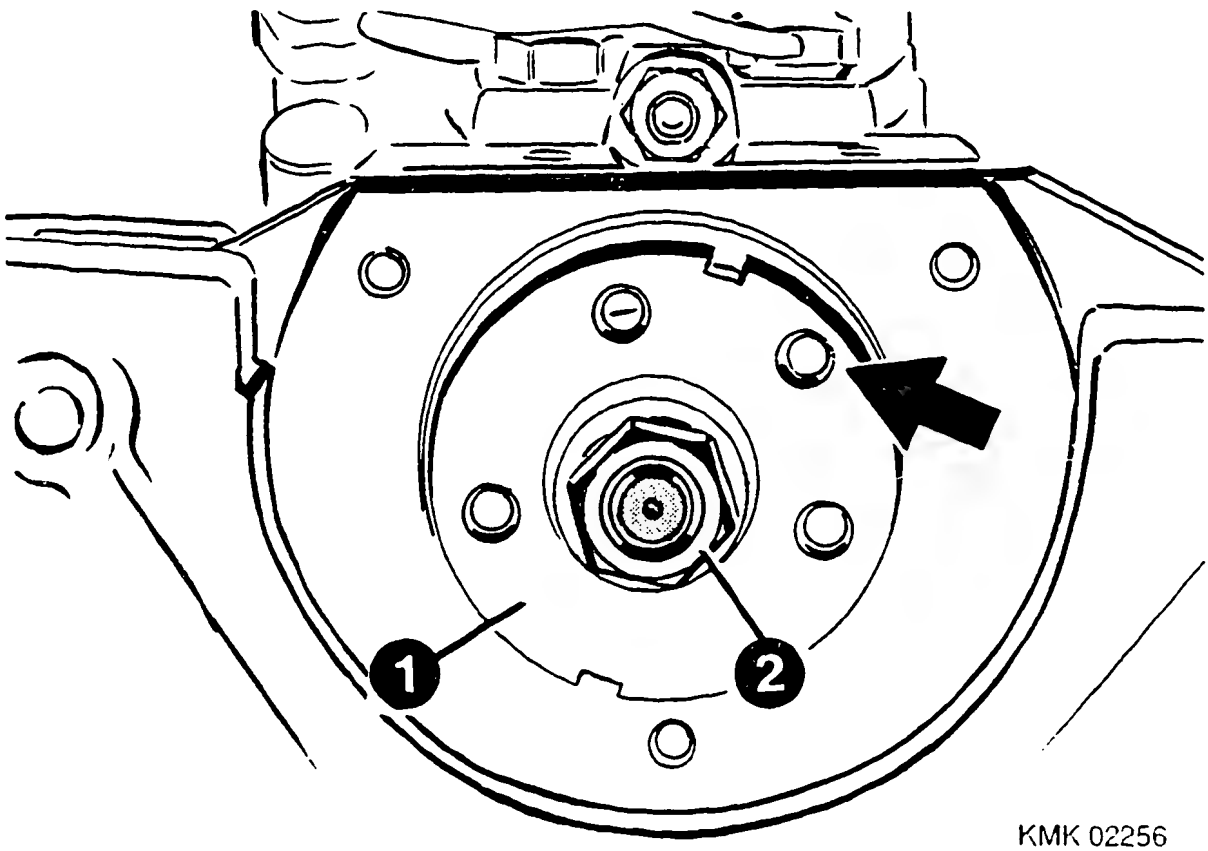
ADJUSTING START OF DELIVERY

1 = Coupling half
2 = Fastening nut

Screw fastening nut onto coupling half and tighten to tightening torque of 60...70 Nm.
Counter-hold coupling half with suitable wrench.

Do not counter-hold coupling half at setting hole (arrow).

Continue: K20/1 Fig.: K19/2



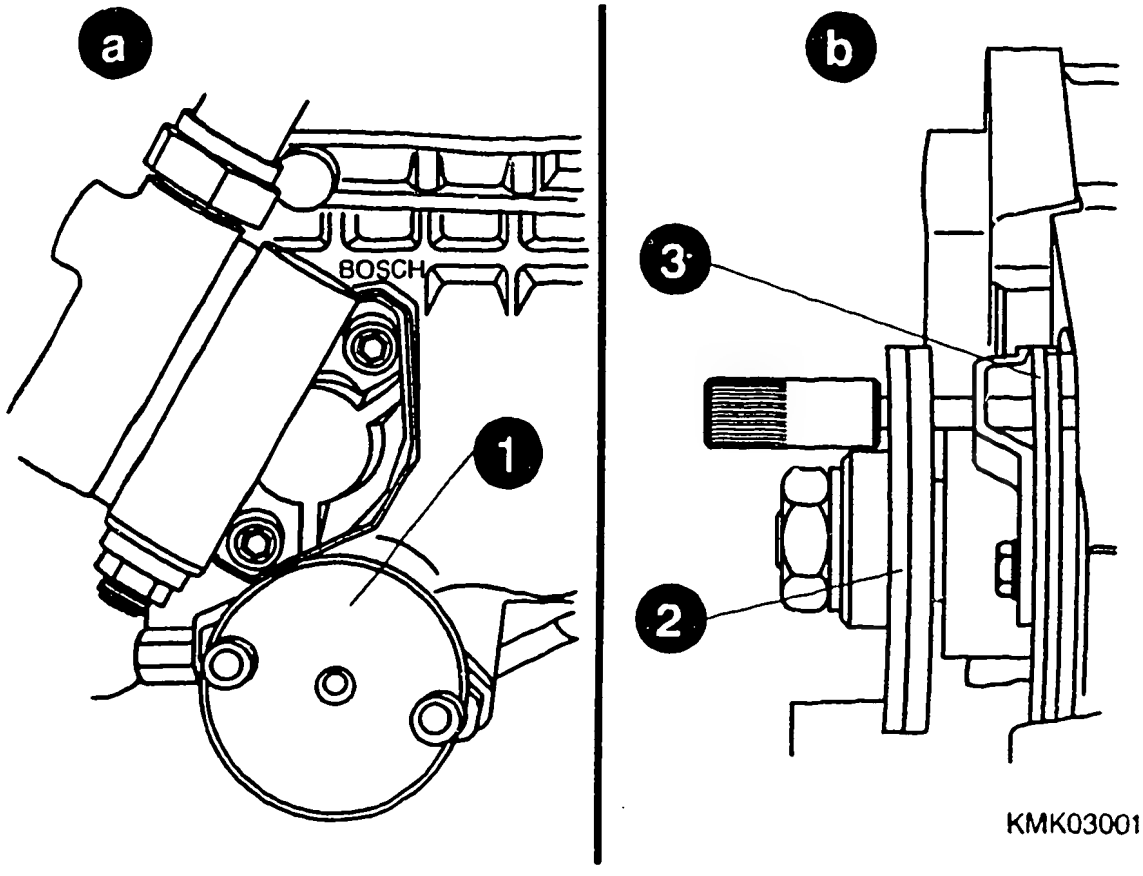
KMK 02256

ADJUSTING START OF DELIVERY

1 = Timing-device cover KDEP 1151
(only fit on pumps featuring HBA)
2 = Coupling half
3 = Notched plate

Remove timing-device cover on delivery end.
Fit timing-device cover KDEP 1151 with 3 mm collar.
Attach stroke measuring device and set dial indicator to "zero".
Turn pump drive shaft in direction of pump rotation until setting pin KDEP 1150 can be inserted through coupling half and notched plate.

Continue: K21/1 Fig.: K20/2

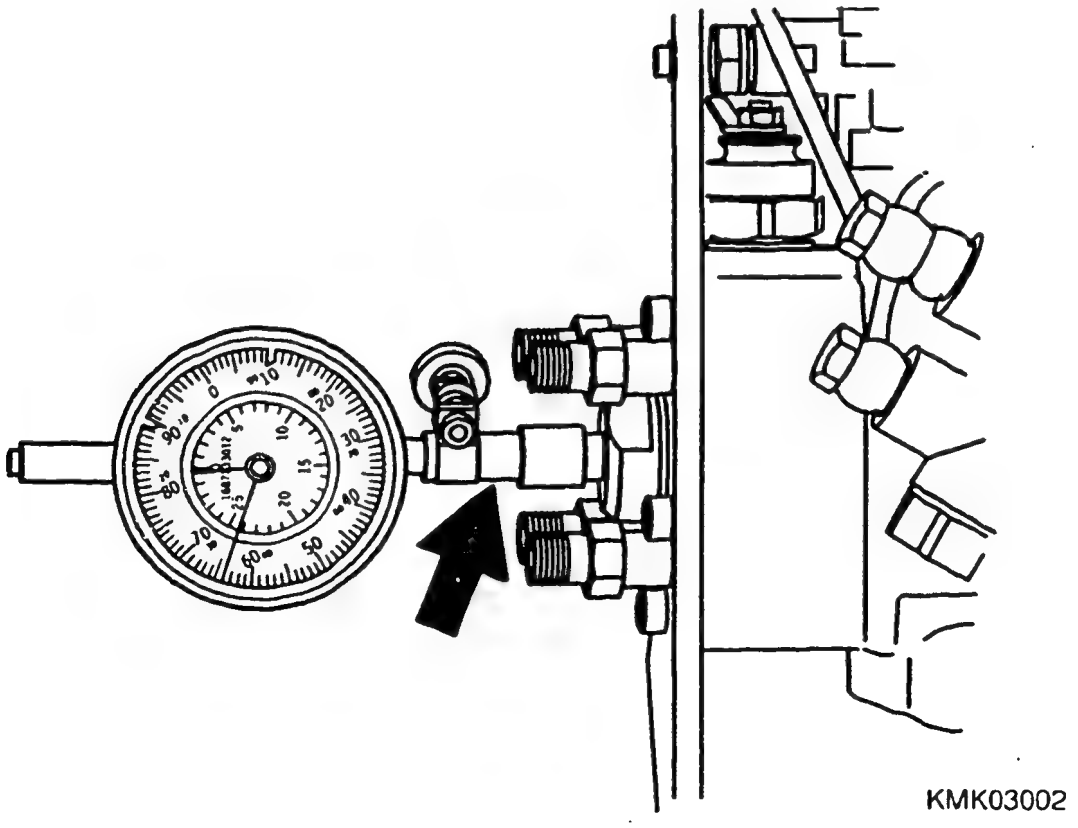


ADJUSTING START OF DELIVERY

Arrow = Stroke measuring device

Relieve drive shaft with setting pin fitted and compare displayed actual stroke value to set value as per test-specification sheet.

Continue: K22/1 Fig.: K21/2



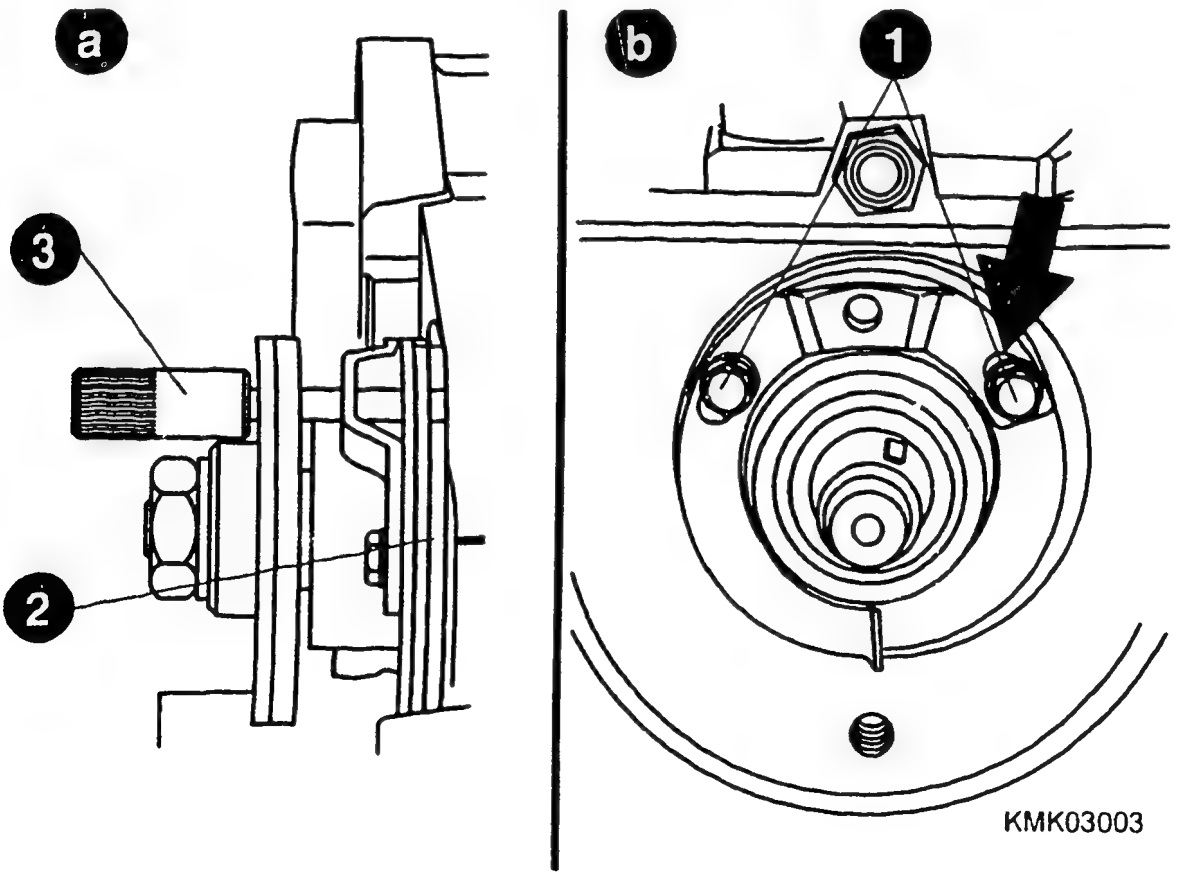
ADJUSTING START OF DELIVERY

1 = Fastening screws
2 = Notched plate
3 = Setting pin

* Stroke adjustment

Loosen fastening screws of notched plate and secure in new position such that set value as per test-specification sheet is obtained after relieving drive shaft.
Remove setting pin.

Continue: K23/1 Fig.: K22/2



ADJUSTING START OF DELIVERY

Attach original timing-device cover.
Remove stroke measuring device.
Fit bleeder screw with new packing disk.
Tighten fastening screws of notched plate to 4...6 Nm.

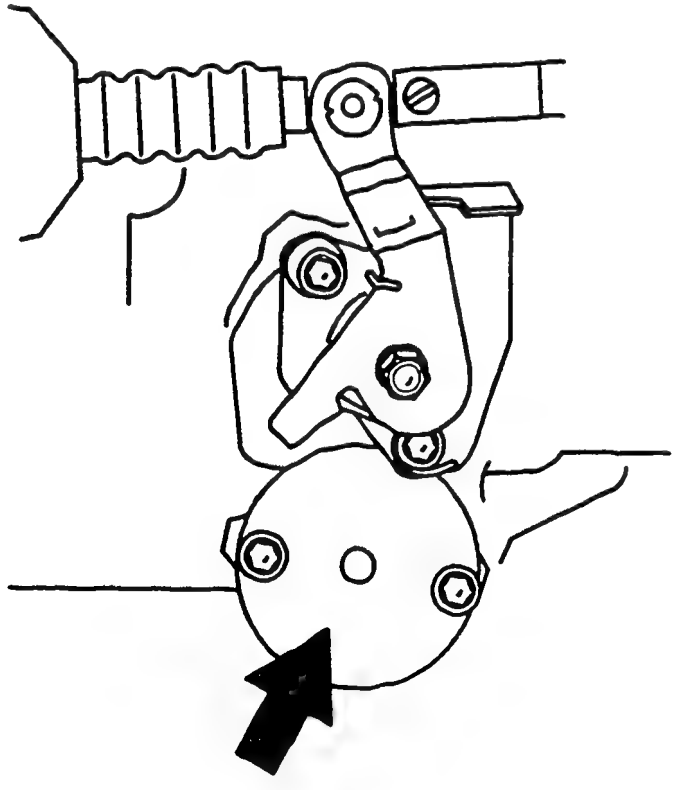
Continue: H08/1

ADJUSTING START OF DELIVERY
* Pump with HBA

* Blocking of drive shaft with locking screw
Data in test-specification sheet "Start-of-delivery-blocking"

Arrow = Timing-device cover KDEP 1151
Remove original timing-device cover on delivery end.
Fit timing-device cover KDEP 1151 on delivery end.
Remove bleeder screw.
Inset Woodruff key into drive-shaft keyway.

Continue: K25/1 Fig.: K24/2

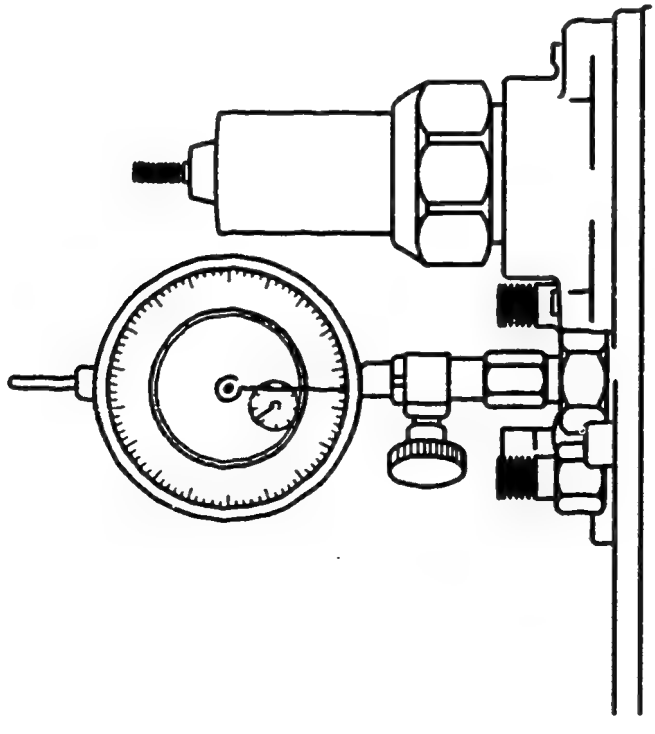


KMK03004

ADJUSTING START OF DELIVERY

Slip drive coupling onto drive shaft. Attach plunger-stroke measuring device KDEP 1085 (see picture) and set dial indicator to "zero" in BDC position of distributor pump plunger.

Continue: K26/1 Fig.: K25/2



KMK02329

ADJUSTING START OF DELIVERY

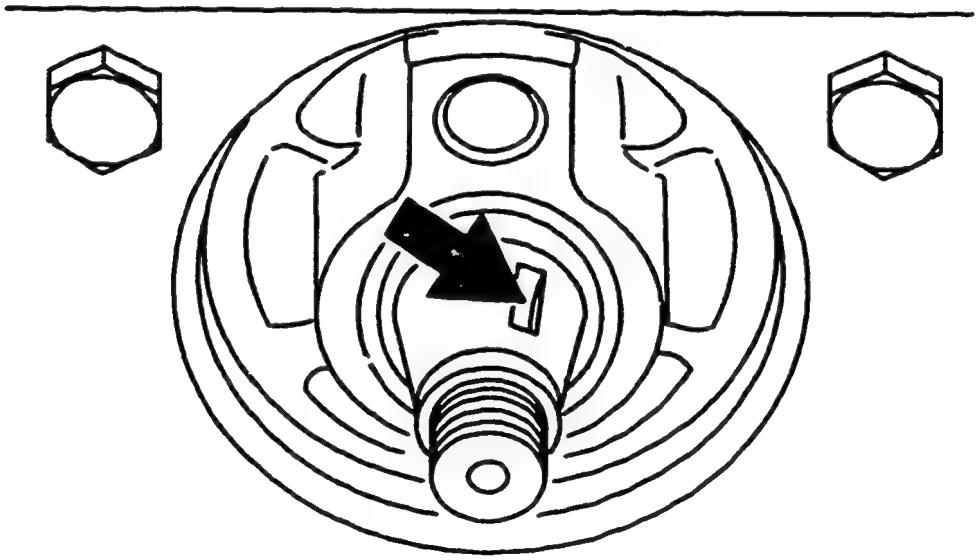
1 = Keyway

Turn pump drive shaft in direction of pump rotation until drive-shaft keyway points to appropriate outlet on distributor head.
Slowly continue turning drive shaft until setting is attained.

Setting for appropriate outlet is given in test-specification sheet under locked timing.

Adjust setting to upper tolerance.

Continue: K27/1 Fig.: K26/2



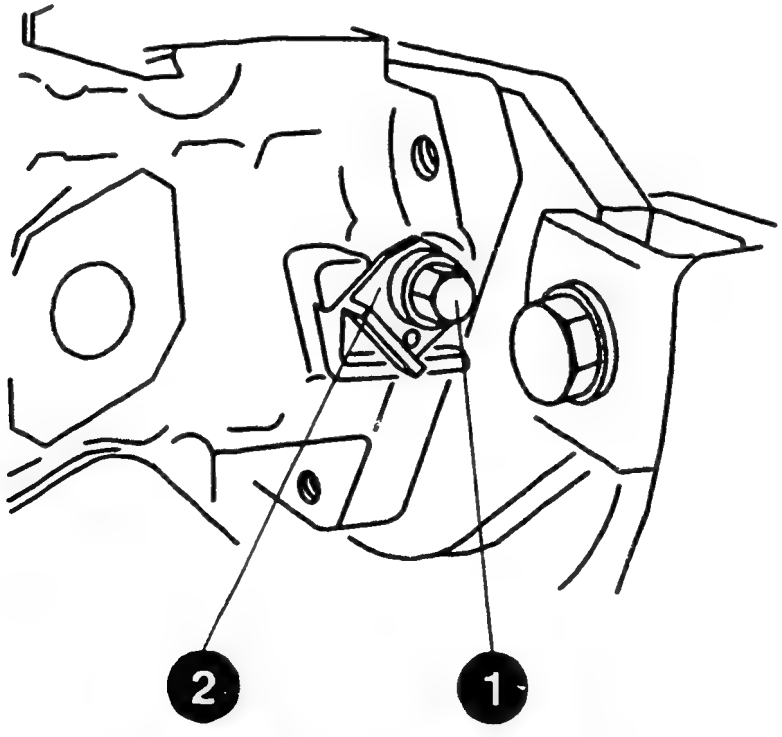
KMK02330

ADJUSTING START OF DELIVERY

1 = Locking screw
2 = Support plate

Repeat adjustment procedure if setting is passed.
Remove support plate of locking screw and attach to control lever with sealing wire.
Screw in locking screw and block drive shaft.
Tightening torque 27...35 Nm.

Continue: K28/1 Fig.: K27/2



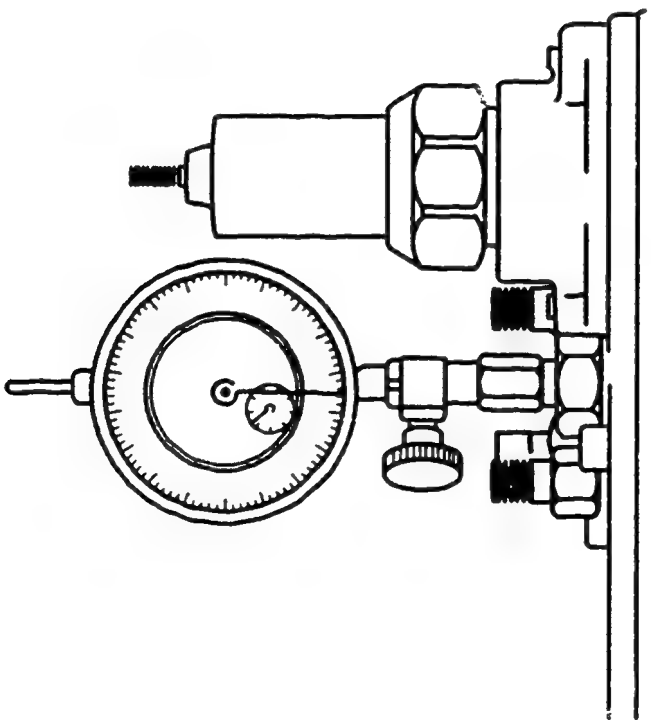
KMK02331

ADJUSTING START OF DELIVERY

Observe setting during blocking of drive shaft.
Repeat adjustment procedure if value deviates.

Remove plunger-stroke measuring device and screw in bleeder screw with new packing disk.

Continue: L01/1 Fig.: K28/2



KMK02329

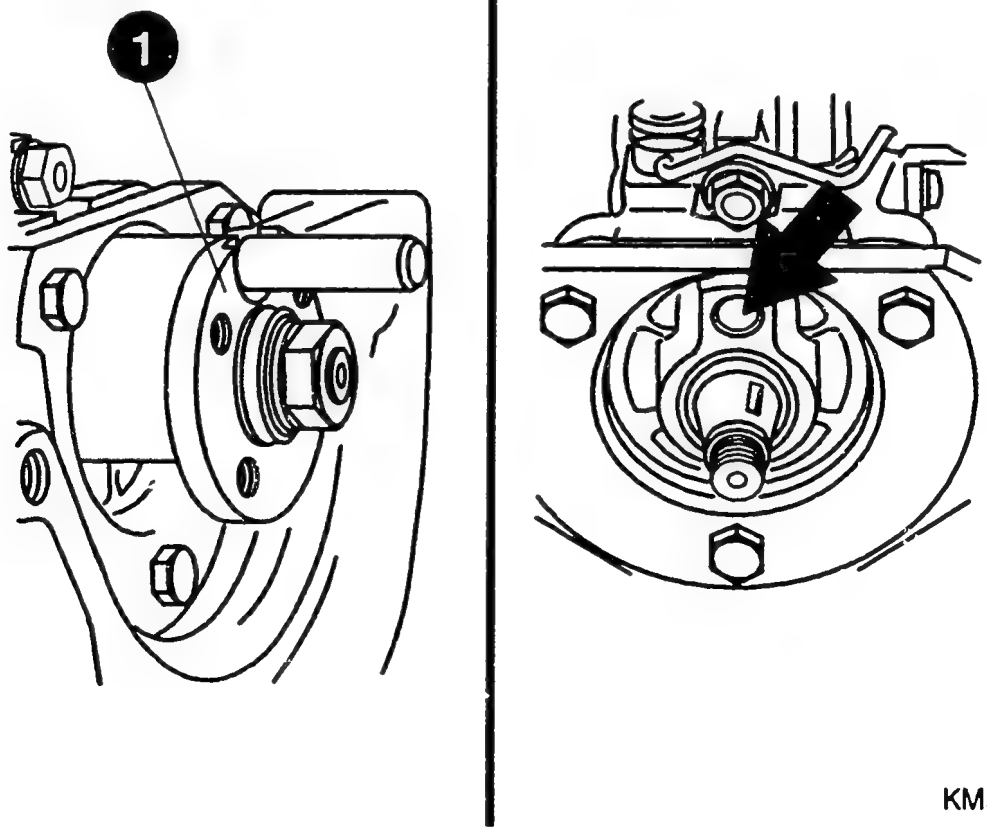
ADJUSTING START OF DELIVERY

1 = Coupling half

* Fitting coupling half

Remove drive coupling (test bench).
Do not turn drive shaft whilst doing so.
Clean tapered surfaces (grease and dirt-free).
Fit coupling half and turn until setting mandrel KDEP 1173 can be inserted through coupling half into setting hole (arrow).

Continue: L02/1 Fig.: L01/2



KMK02332

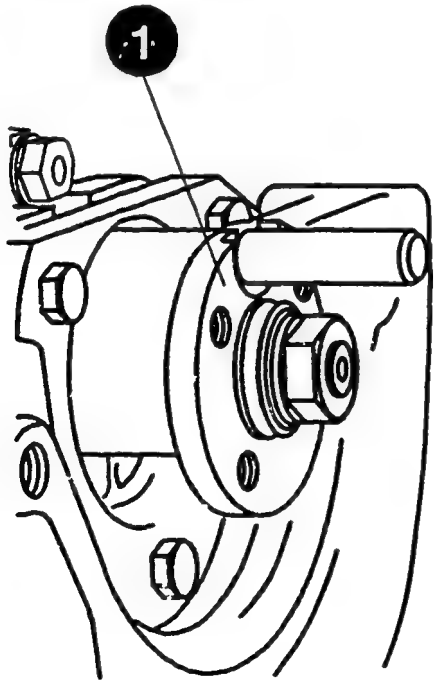
ADJUSTING START OF DELIVERY

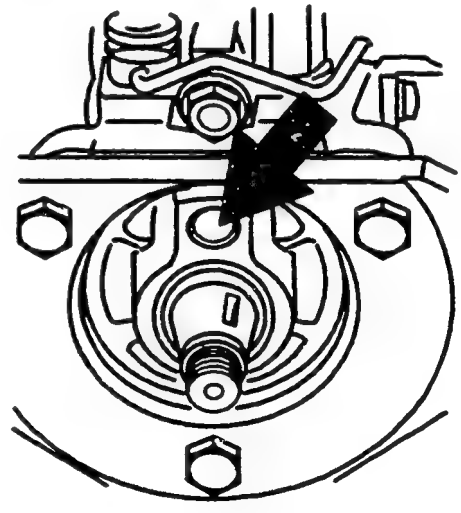
1 = Coupling half

Attach securing nut to coupling half and tighten to pre-tightening torque 30 Nm.

I M P O R T A N T
Do not counterhold coupling half by means of setting mandrel in setting hole (arrow).
Loosen locking screw.

Continue: L03/1 Fig.: L02/2





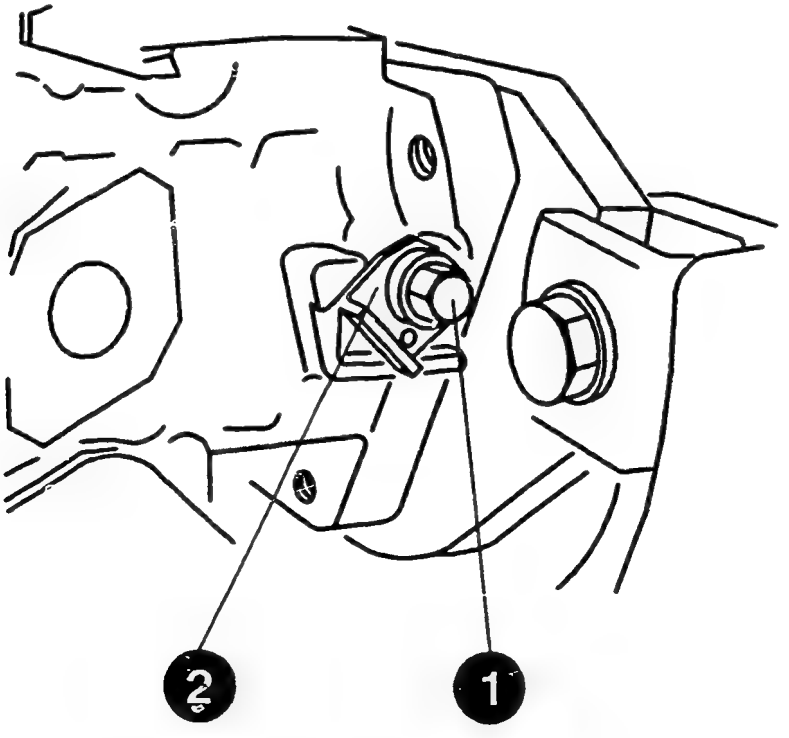
KMK02332

ADJUSTING START OF DELIVERY

1 = Locking screw
2 = Support plate

Loosen locking screw.
Place support plate beneath locking screw and tighten locking screw to 27...35 Nm.

Continue: L04/1 Fig.: L03/2



KMK02331

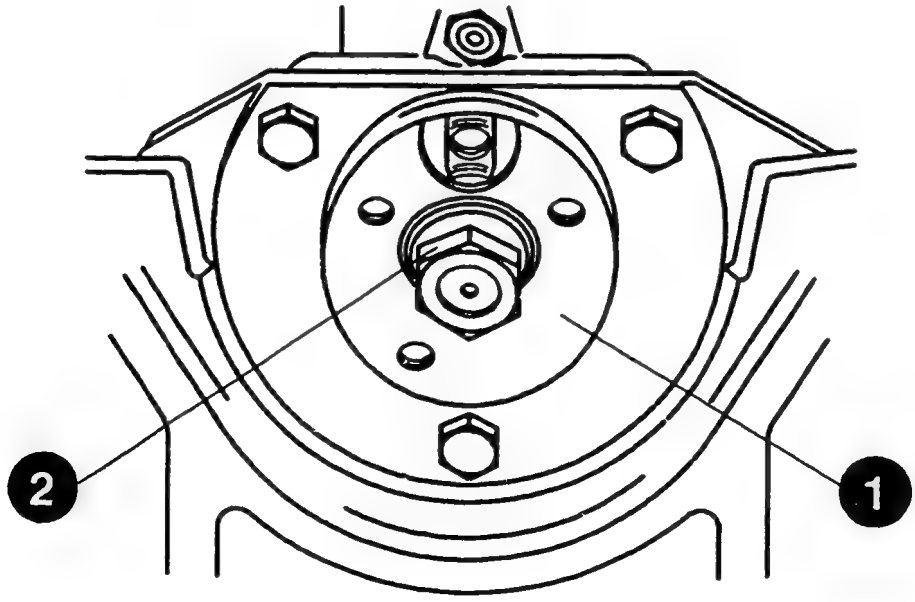
ADJUSTING START OF DELIVERY

1 = Coupling half
2 = Securing nut

Counterhold drive shaft and tighten securing nut (coupling half).

Hexagon nut	90...95 Nm
Flat nut	70...75 Nm

Continue: H08/1 Fig.: L04/2



KMK02333

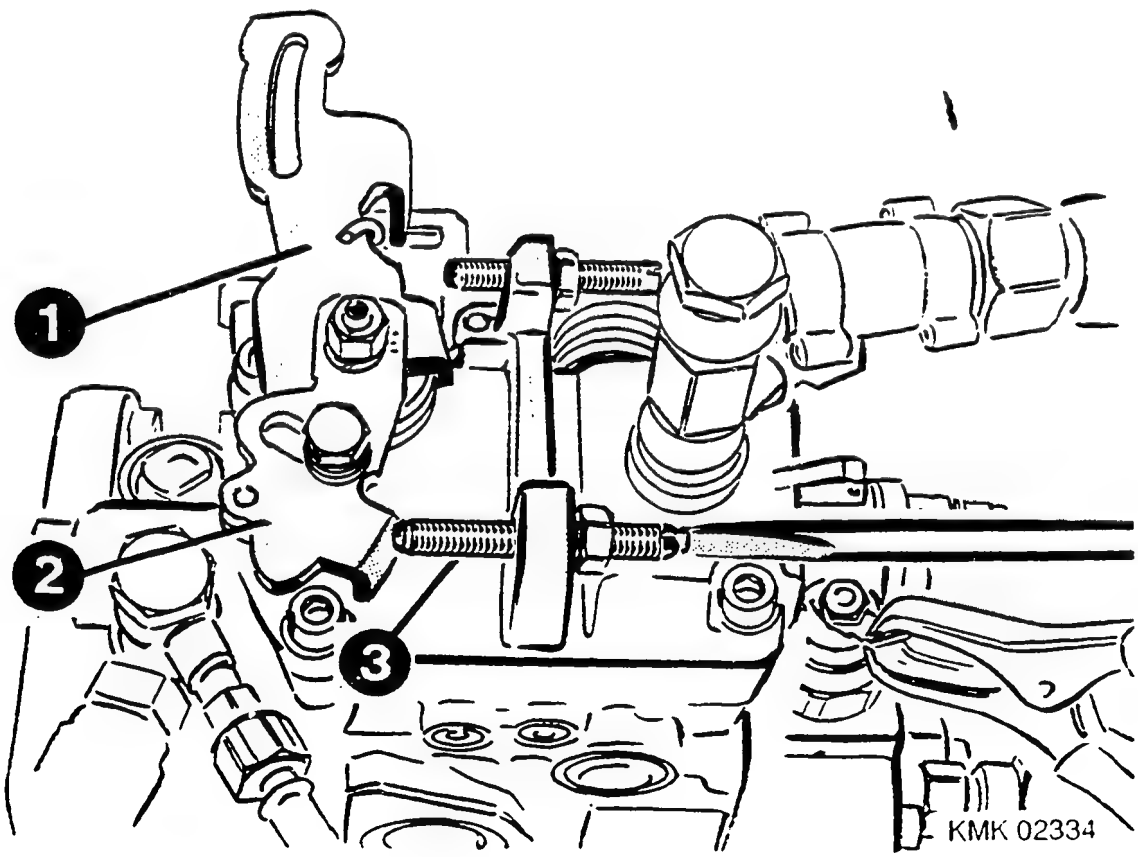
ADJUSTING CONTROL-LEVER POSITION "XK"
* Preadjusting low-idle speed regulation/residual quantity

1 = Long control lever
2 = Short control lever
3 = Adjusting screw

Position both control levers at idle adjusting screw/residual-quantity adjusting screw.

Preset idle quantity with adjusting screw at stated speed.

Continue: L06/1 Fig.: L05/2

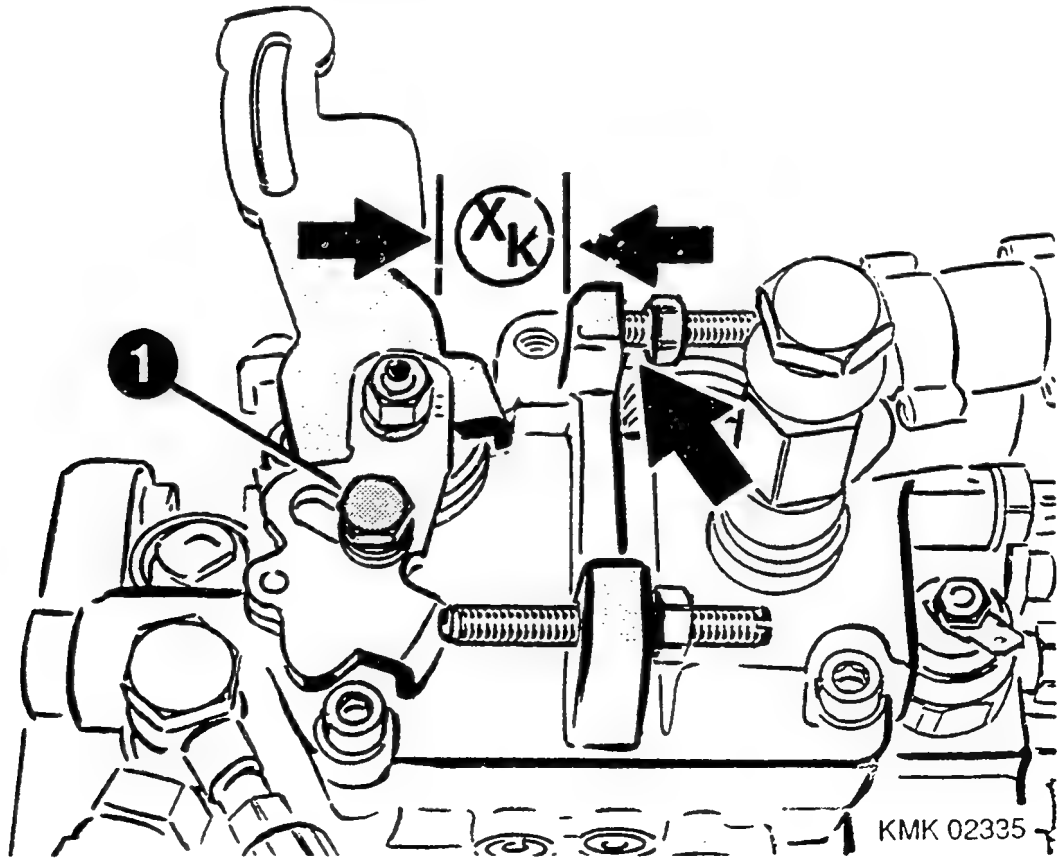


ADJUSTING CONTROL-LEVER POSITION "XK"
 * Preadjusting low-idle speed regulation

1 = Hexagon bolt

Screw out hexagon bolt.
Remove washer for reasons of space for next operation (stamping of control lever) and screw hexagon bolt half way in again with lock washer.
Screw back speed adjusting screw (arrow).
Set control lever to spacing dimension "XK" (refer to test-specification sheet).
Tighten hexagon nut.

Continue: L07/1 Fig.: L06/2

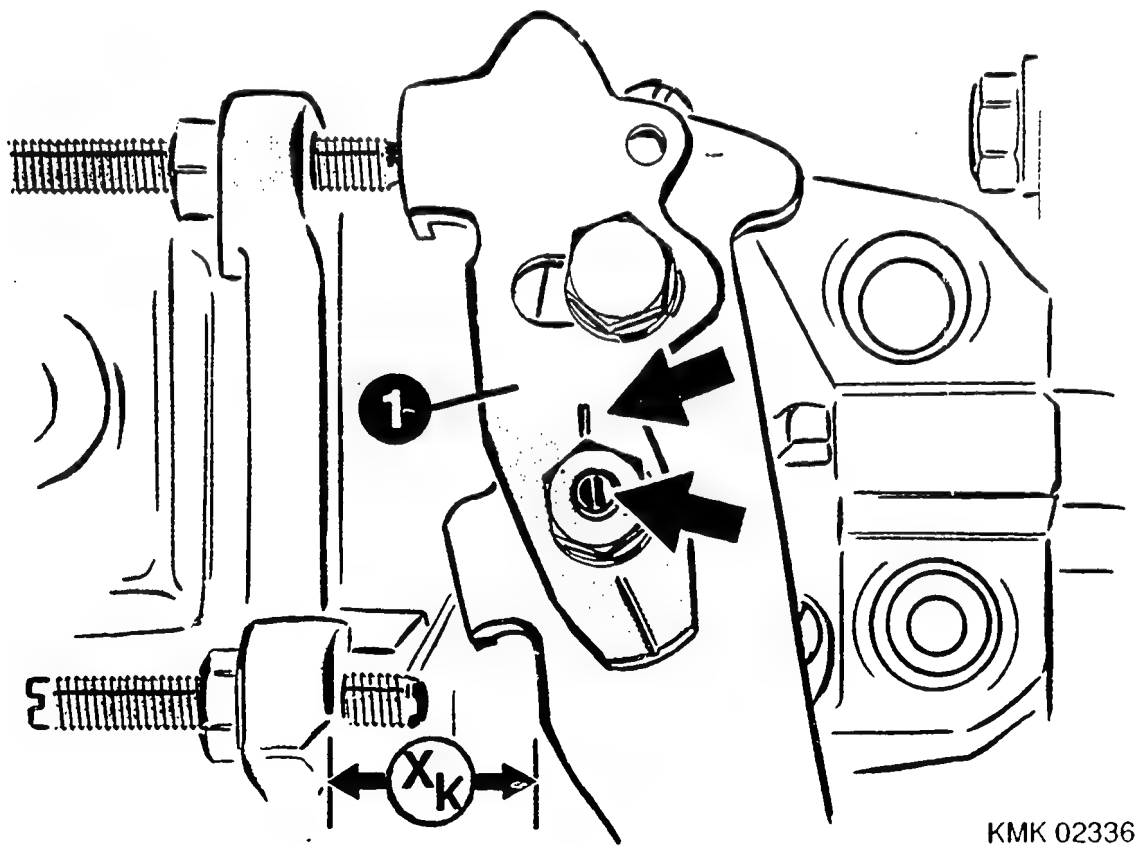


ADJUSTING CONTROL-LEVER POSITION "XK"
* Preadjusting low-idle speed regulation

1 = Short control lever

If both control levers are already stamped, the short control lever must be replaced with a new lever if the dimension "XK" is not attained.
Before removing control lever, mark mutual positions of setting shaft and control lever (arrows).

Continue: L08/1 Fig.: L07/2



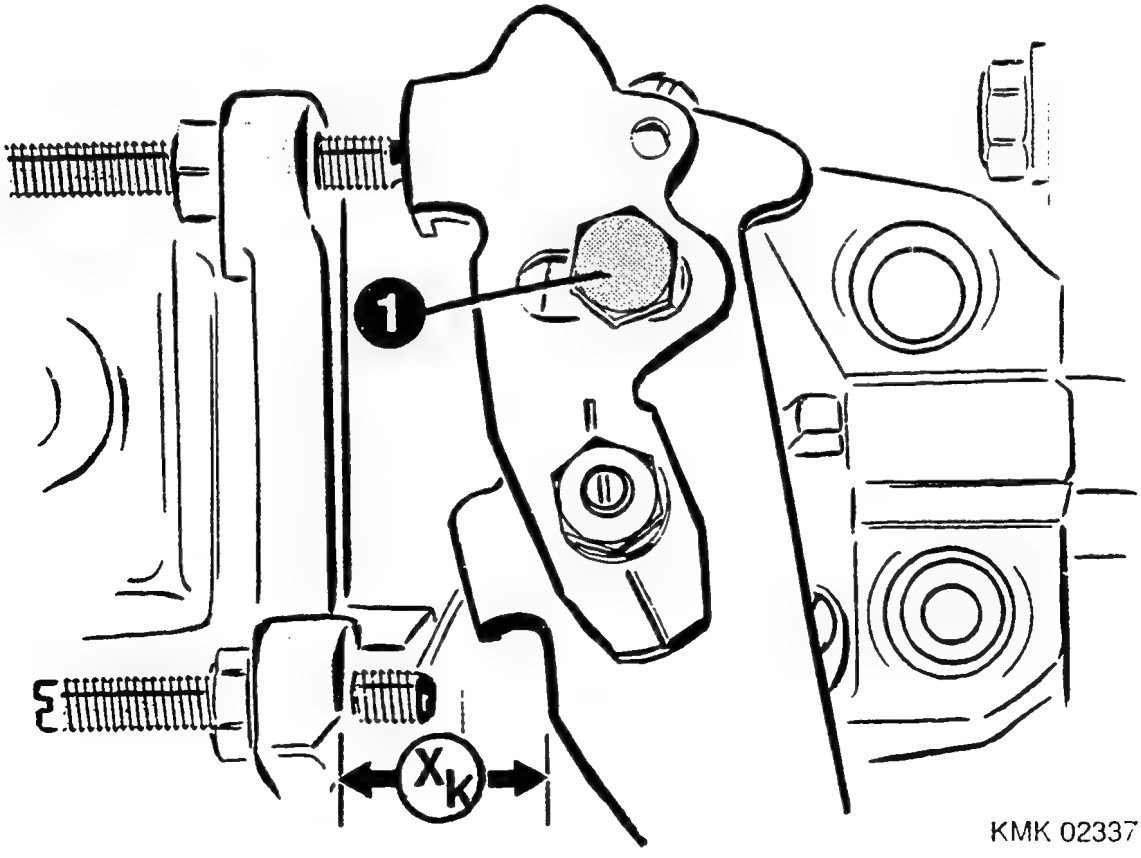
KMK 02336

ADJUSTING CONTROL-LEVER POSITION "XK"
 * Preadjusting low-idle speed regulation

1 = Hexagon bolt

Adjust dimension "XK" after fitting new control lever.
Do not install washer.
Tighten hexagon nut.

Continue: L09/1 Fig.: L08/2



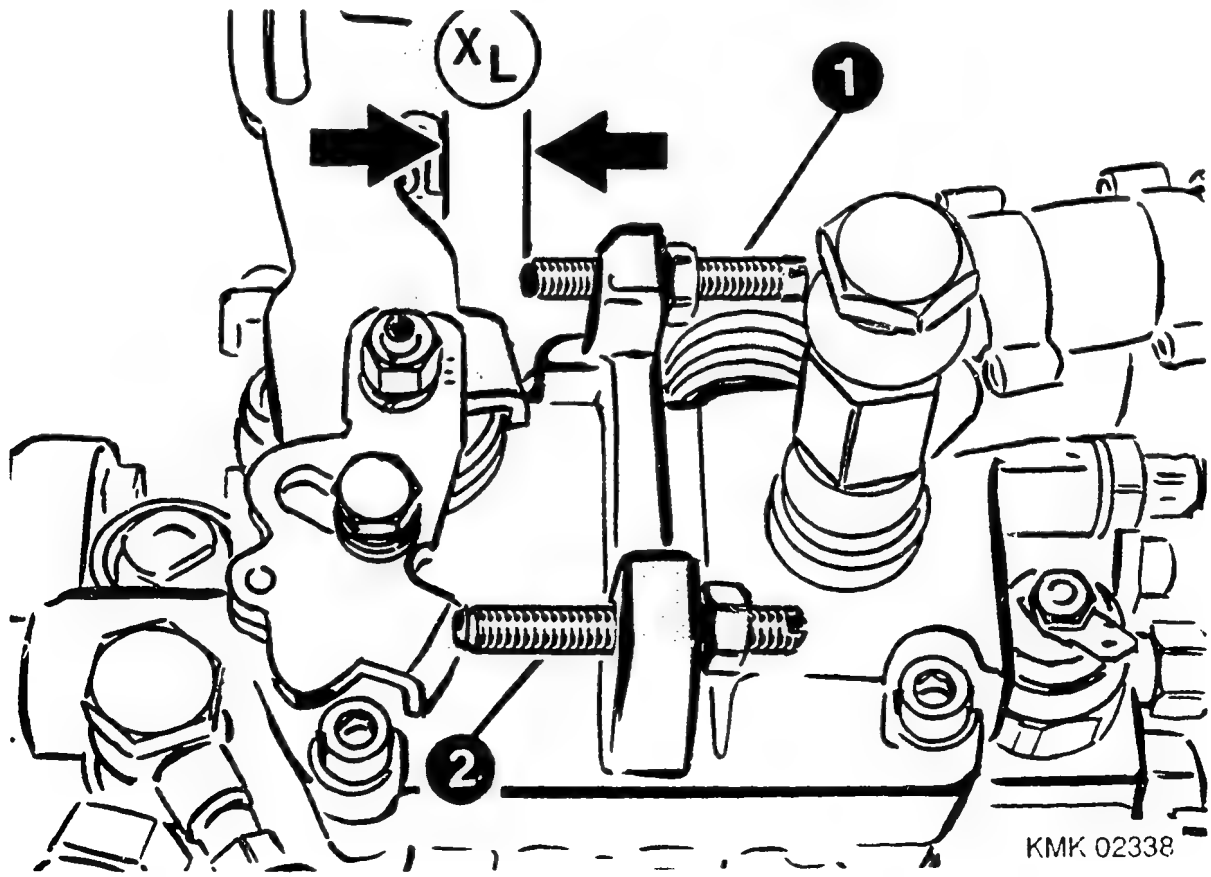
KMK 02337

SETTING CONTROL-LEVER POSITION "XL"
 * Preadjusting full-load speed regulation

1 = Rated-speed adjusting screw
2 = Idle adjusting screw

Position long control lever at rated-speed adjusting screw.
Measure delivery at stated speed.
Effect correction at rated-speed adjusting screw.
Position short control lever at idle adjusting screw and measure dimension "XL".

Continue: L10/1 Fig.: L09/2

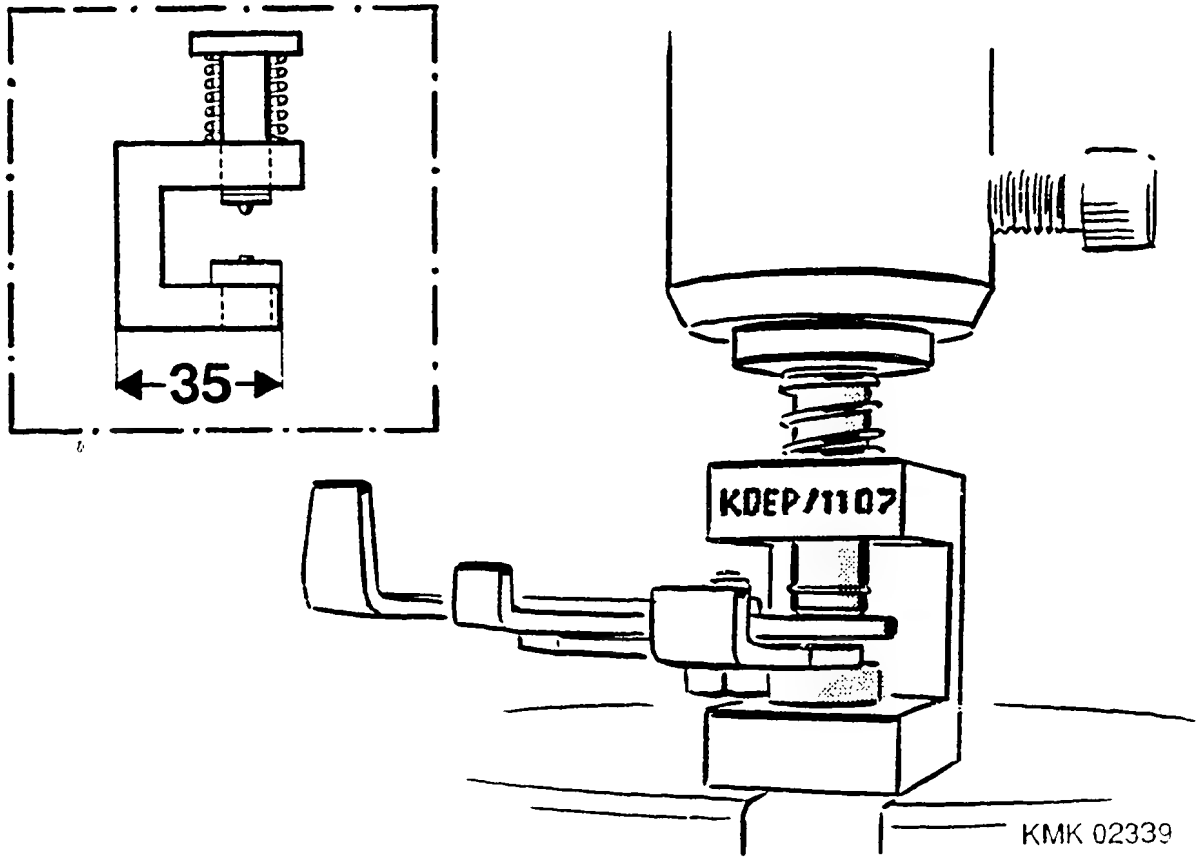


STAMPING CONTROL LEVERS

Unscrew securing nut of setting shaft.
Remove spring washer.
Detach control lever from setting shaft.
No longer alter position of control lever.

Stamp both control levers with stamping tool KDEP 1107.
Stamping tool is to be modified as shown in the case of control levers with soldered-in threaded pins.

Continue: L11/1 Fig.: L10/2



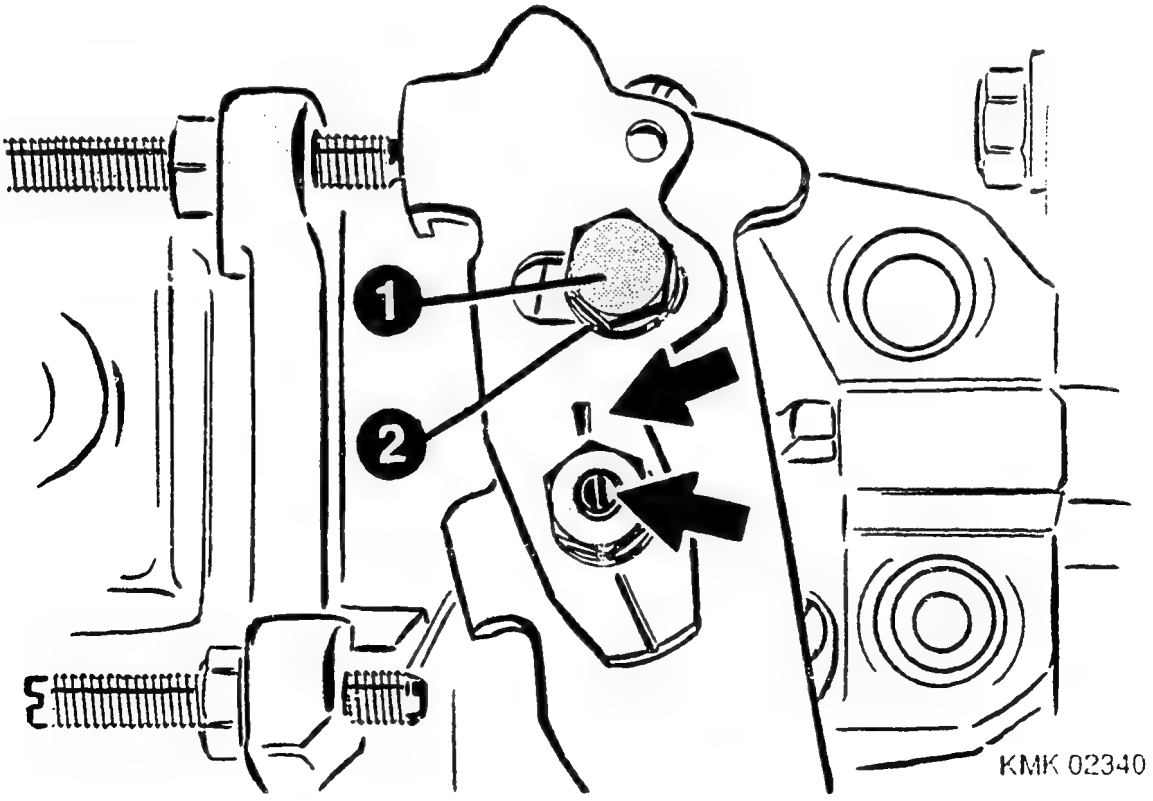
CHECKING FULL-LOAD DELIVERY

1 = Hexagon nut
2 = Spring washer

Attach control lever to setting shaft such that marks on control lever and setting shaft coincide (arrows).

Fit spring washer and hexagon nut and tighten to 6...9 Nm.

Continue: L12/1 Fig.: L11/2

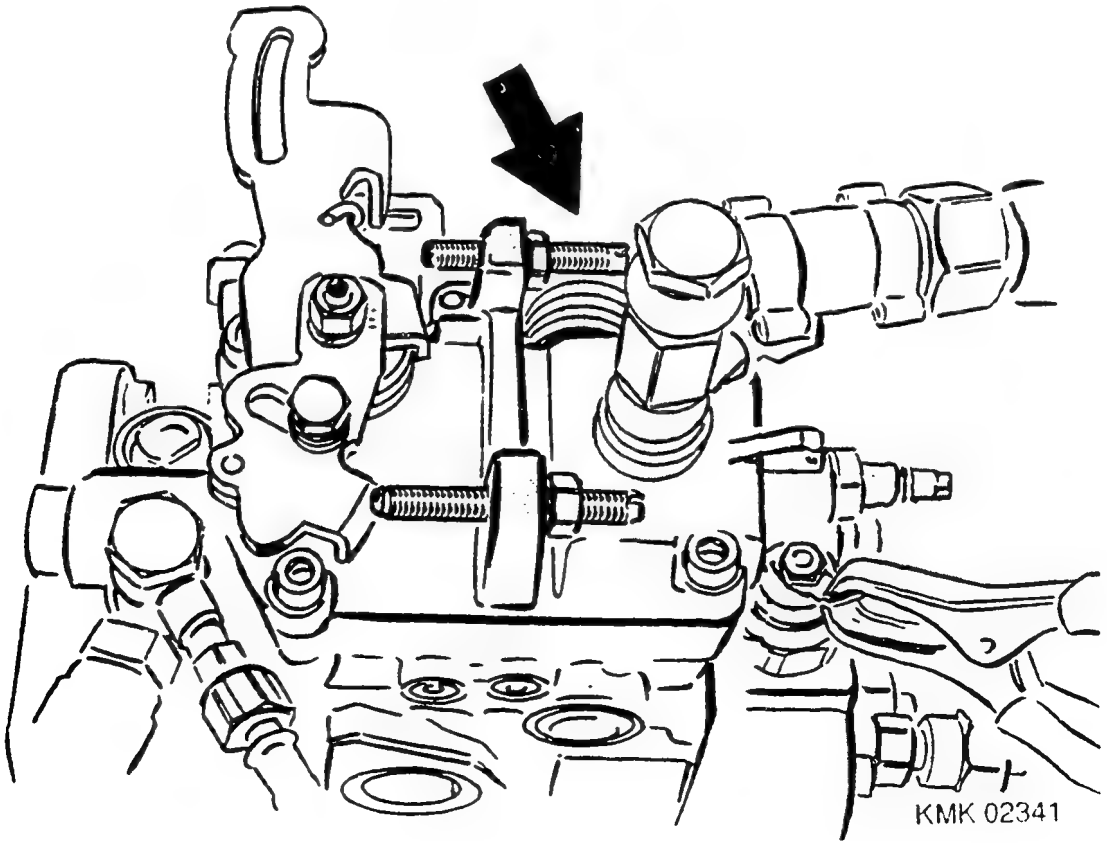


CHECKING FULL-LOAD DELIVERY

Arrow = Rated-speed adjusting screw

Unscrew hexagon bolt at control lever and fit washer.
Screw in rated-speed adjusting screw; check/adjust full-load delivery.

Continue: H08/1 Fig.: L12/2



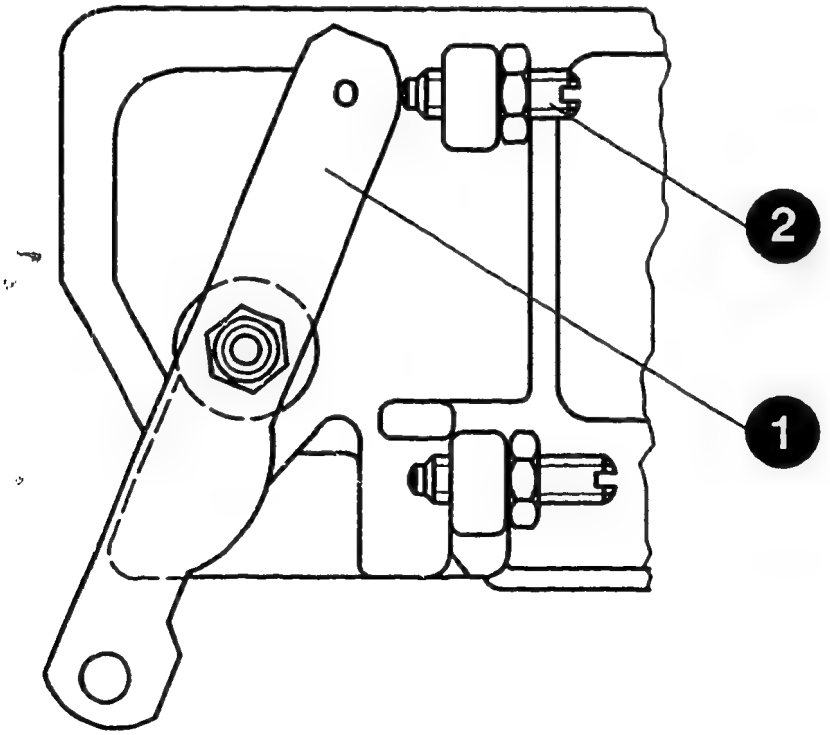
ADJUSTING CONTROL-LEVER POSITION "A"
* Pump with 1-piece control lever

1 = Control lever
2 = Idle adjusting screw

* Adjusting low-idle speed regulation

Position control lever at idle adjusting screw.
Adjust delivery as prescribed with idle adjusting screw at stated speed.

Continue: L14/1 Fig.: L13/2



KMK02342

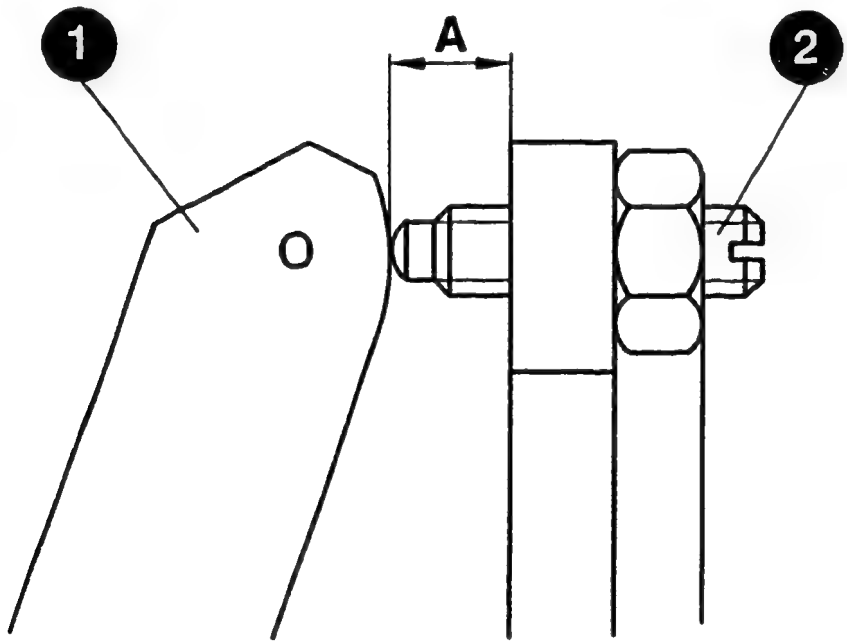
ADJUSTING CONTROL-LEVER POSITION "A"
 * Pump with 1-piece control lever

1 = Control lever
2 = Idle adjusting screw

 * Adjusting low-idle speed regulation

Measure dimension "A" of idle adjusting screw and compare to test-specification sheet.
If the permitted dimension is not attained, move control lever around on setting-shaft toothing.

Continue: L15/1 Fig.: L14/2



KMK02343

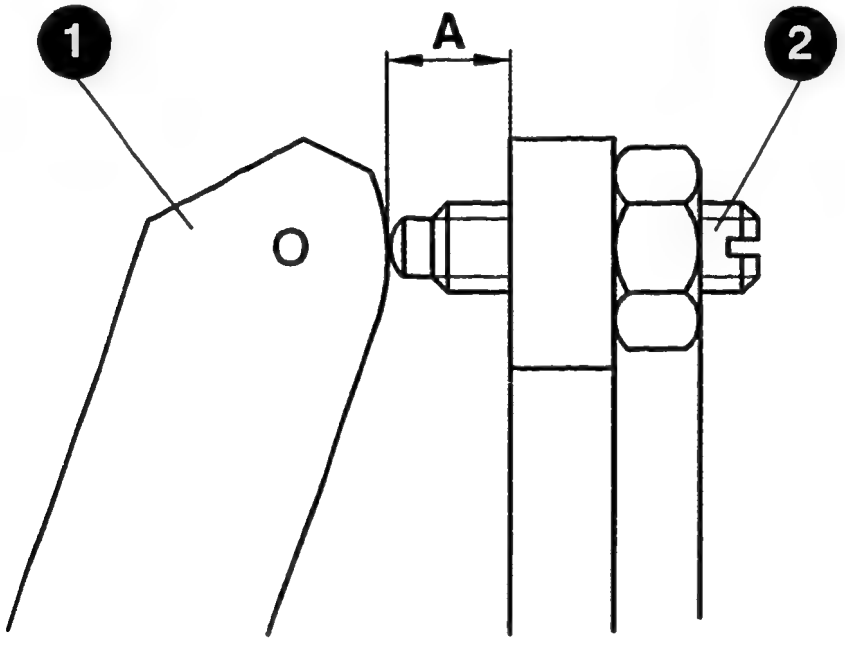
ADJUSTING CONTROL-LEVER POSITION "A"
* Pump with 1-piece control lever

* Adjusting low-idle speed regulation

Fit securing nut at control lever.
Tightening torque 5...10 Nm

Control levers marked with "0" are offset by half a tooth with respect to control levers with no "0".

Continue: L16/1 Fig.: L15/2



KMK02343

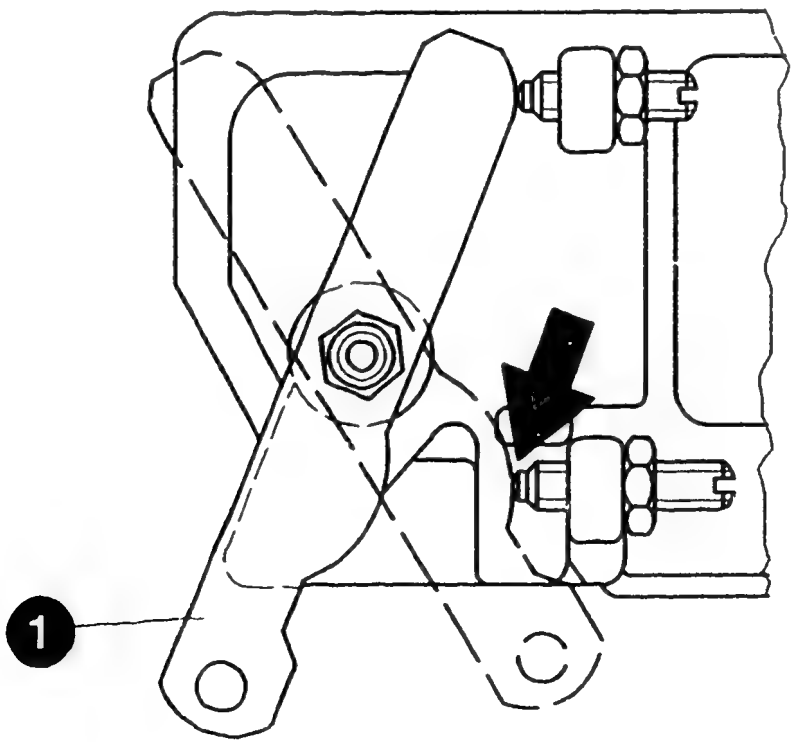
ADJUSTING CONTROL-LEVER POSITION "B"
* Pump with 1-piece control lever

1 = Control lever

* Adjusting full-load speed regulation

Position control lever at rated-speed adjusting screw (arrow).
Turn in adjusting screw until delivery is attained at stated speed.

Continue: L17/1 Fig.: L16/2



KMK02344

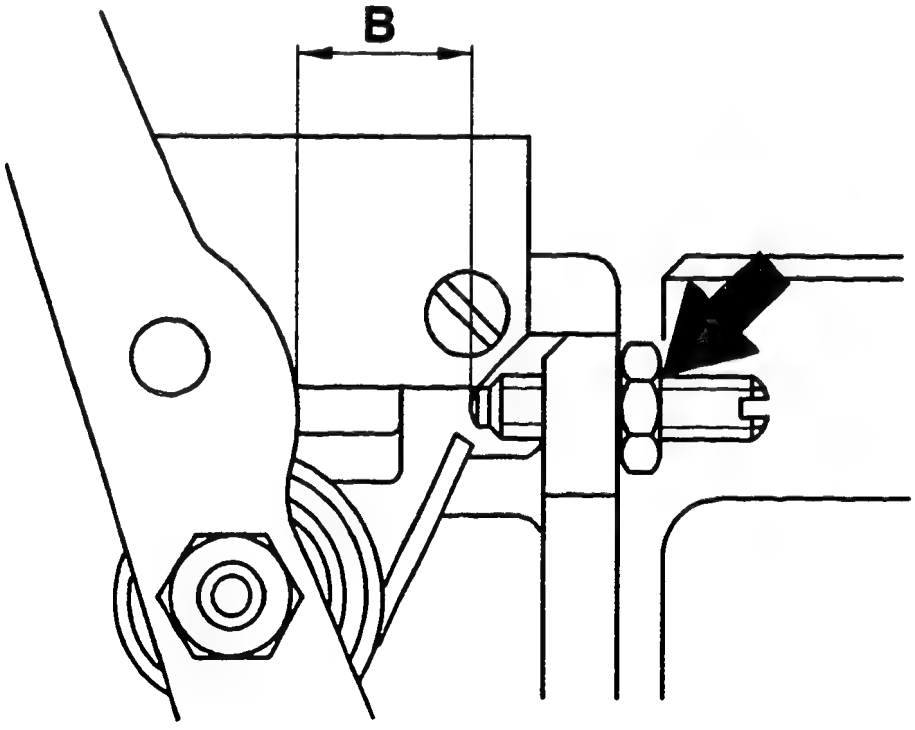
ADJUSTING CONTROL-LEVER POSITION "B"
* Pump with 1-piece control lever

Arrow = Rated-speed adjusting screw

* Adjusting full-load speed regulation

Position control lever at idle
adjusting screw.
Measure dimension "B" - adjustment
travel between idle and rated-speed
adjusting screw - and compare to
value in test-specification sheet.
An incorrect governor spring may have
been installed if measured value is
not attained.

Continue: H08/1 Fig.: L17/2



KMK02345

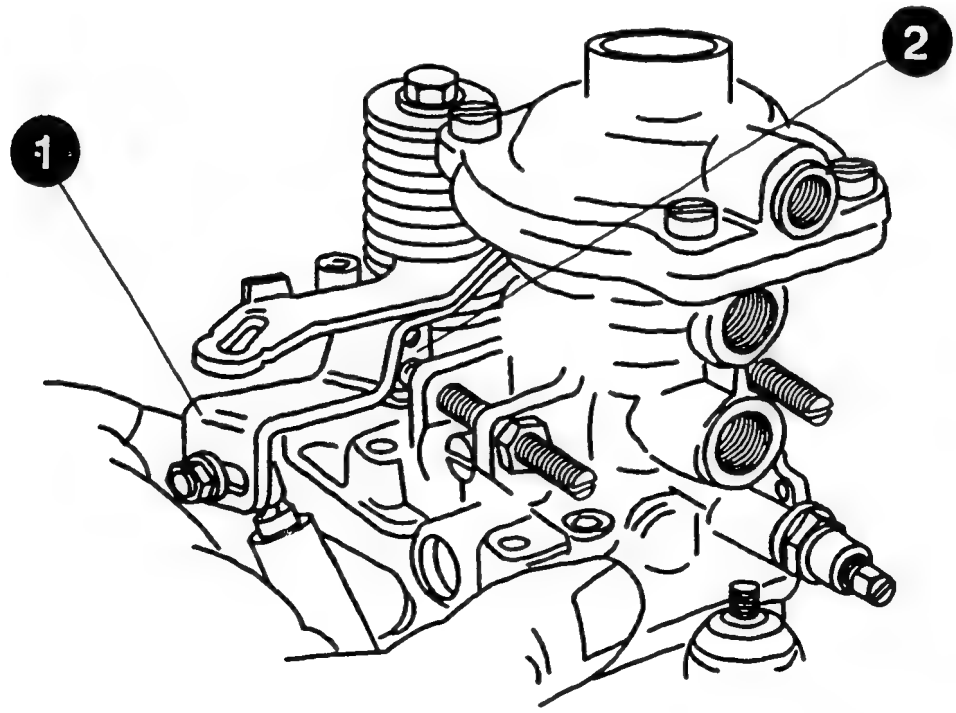
FUNCTIONAL TEST (FLD)

1 = Adjusting lever
2 = Switch lever

Prerequisite:
* Pump set and completely assembled.
* Spherical bolt spacing set for for hydraulic damper

Engage damper in spherical bolt. Move adjusting lever including damper until switch lever makes contact with rated-speed adjusting screw. Fix control lever in this position.

Continue: L19/1 Fig.: L18/2



KMK03006

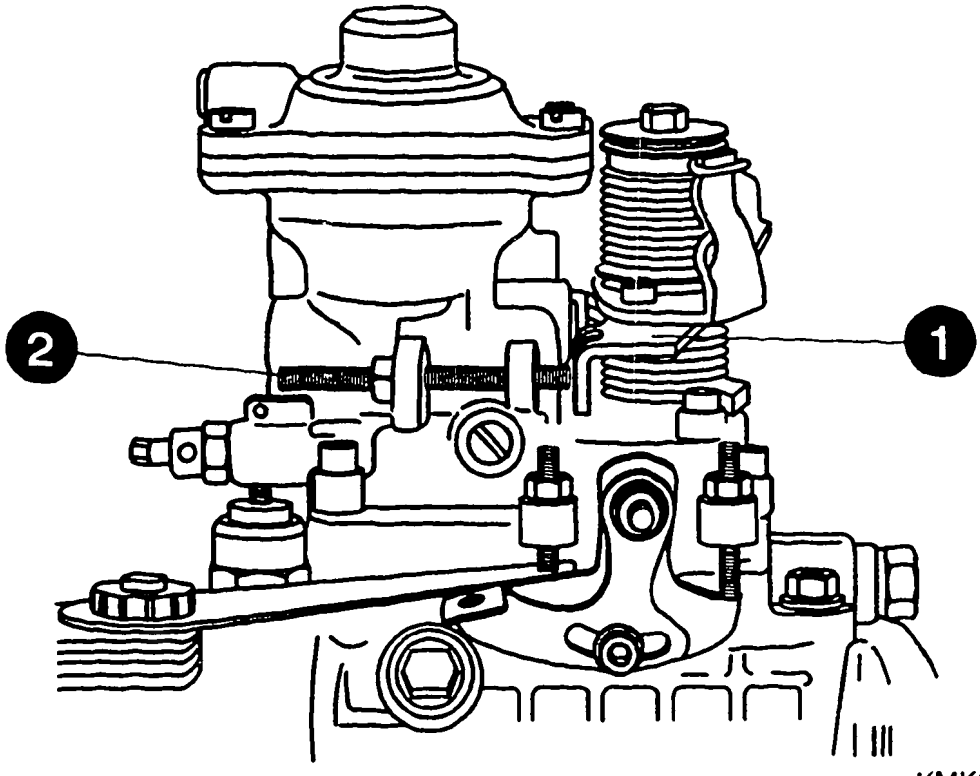
FUNCTIONAL TEST (FLD)

1 = Switch lever
2 = Residual-quantity stop screw

Pull back adjusting lever together with hydraulic damper until switch lever makes contact with residual-quantity stop screw.

Release adjusting lever.
The excess force of the coiled spring must always be sufficient to move the adjusting lever such that the switch-lever-stop makes reliable contact with the rated-speed adjusting screw.

Continue: H08/1 Fig.: L19/2



KMK03007

FUNCTIONAL TEST (MLD)

Prerequisite
* Pump set and completely assembled.
* Spherical bolt spacing set for hydraulic damper

If the lever assembly is correctly set, deflection of the control lever produces the following movement sequence.

Move control lever until damping spring is overcompressed.
Idle-travel spring must not be influenced in this lever position.

Continue: L20/2

FUNCTIONAL TEST (MLD)

Continue moving control lever until idle-travel spring is overcompressed.

The intermediate lever is still in contact with the residual-quantity stop screw in this lever position.
If the lever is moved further, the intermediate lever lifts off the residual-quantity stop screw.

Continue: H08/1

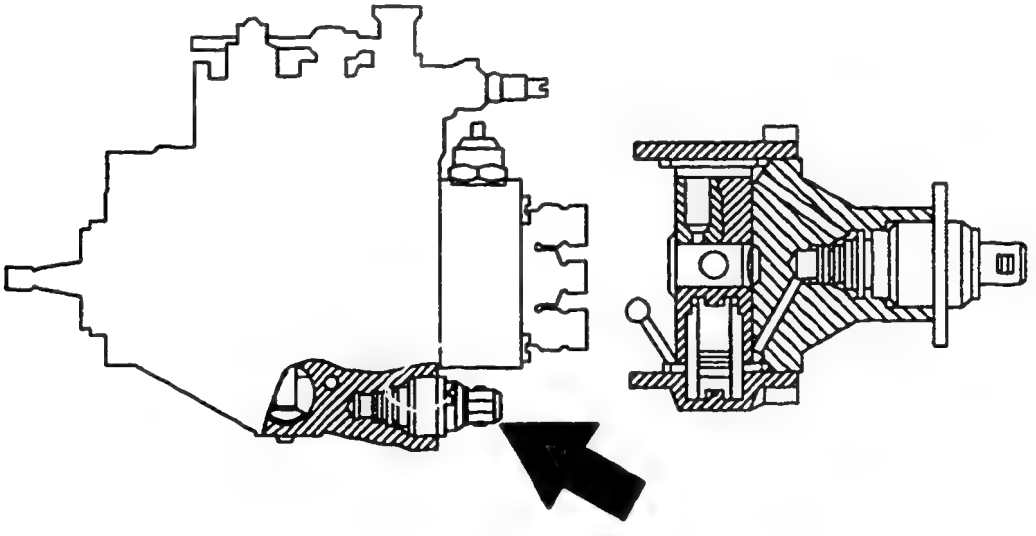
CHECKING FUNCTION OF FREQUENCY VALVE

Establish voltage supply as per test-specification sheet.
Drive pump at appropriate pump speed.
Read off timing-device travel.

If timing-device travels are not obtained, check timing-device washers and frequency valve.

Checking frequency valve:
Internal reistance 15.5...20.5 Ohm at >60°C.

Continue: H08/1 Fig.: L21/2



KMK03008

CHECKING SHUTOFF SOLENOID

Increase voltage from 0 Volt at n = 100 1/min until shutoff solenoid is energized.
Record voltage value and compare to required value.

Holding voltage:
Reduce voltage from rated value until shutoff solenoid deenergizes; zero delivery is reached.
Record voltage value and compare to specified value.

Continue: H08/1

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

Select adjustment sequence in line with following characteristics:

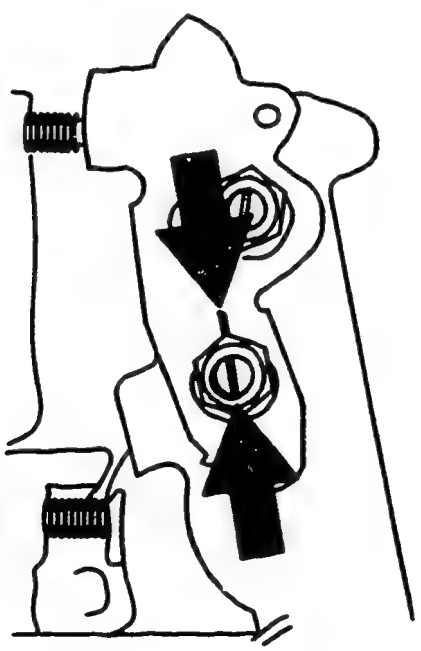
	Coordinate
* Pump with no negative torque control	L24/1
* Pump with negative torque control	M06/1

Continue: L24/1

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
* Checking and adjusting MS dimension

Mark control lever and shaft with respect to one another (arrows).
Remove control lever and coiled spring.
Remove fastening screws of LDA housing.
If rated-speed adjusting screw has to be removed, measure screw-in depth beforehand and note it down. Lift LDA/HBA housing and press adjusting shaft through in direction of inside of cover.
Remove variable-speed / part-load governor.

Continue: L25/1 Fig.: L24/2



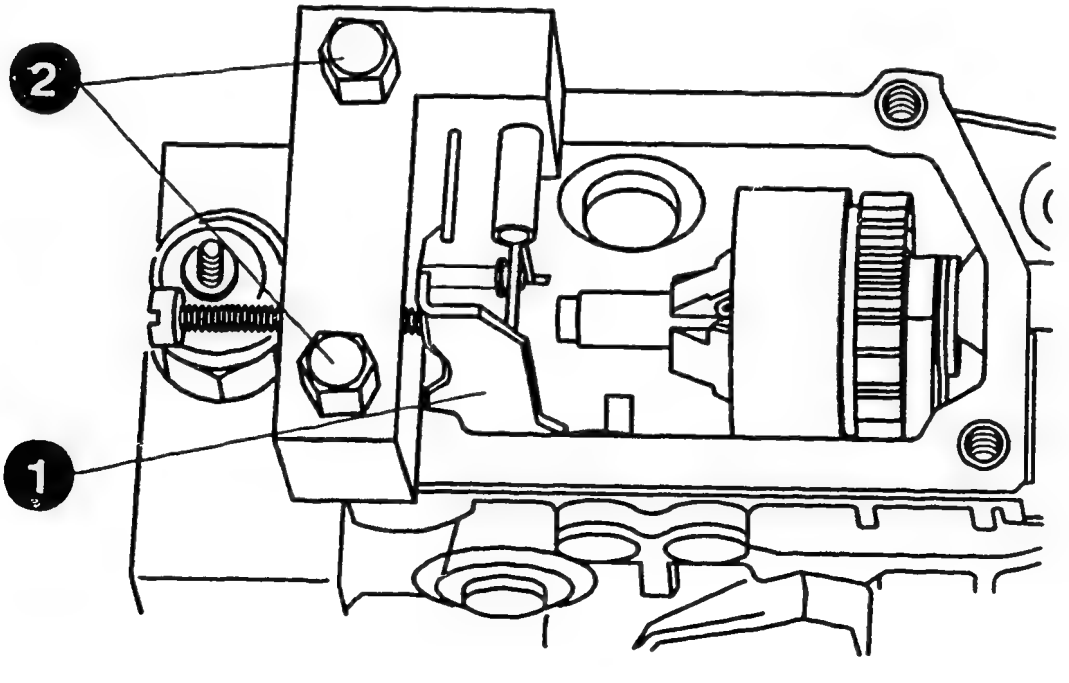
KMK02289

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
 * Checking and adjusting MS dimension

1 = Correction lever
2 = Collar screws

Attach spacer KDEP 1152/1 to pump housing with collar screws (contained in measuring-device set KDEP 1152).

Continue: L26/1 Fig.: L25/2



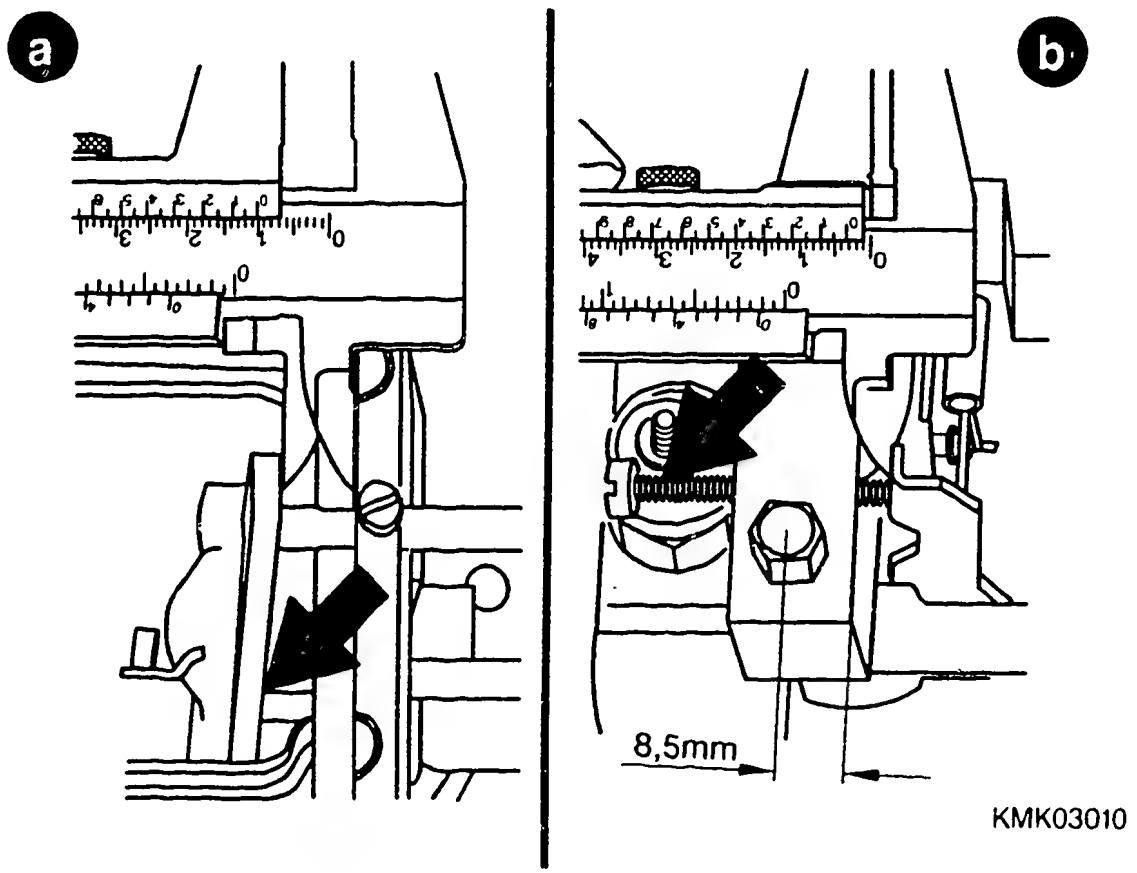
KMK03009

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
* Checking and adjusting MS dimension

- Determine screw-in depth of full-load screw

Position adjustment gauge KDEP 1152/3 on LDA/HBA housing.
Position measurement arm against full-load screw (arrow, picture a).
Use caliper gauge to determine screw-in depth of full-load screw.
Subtract 8.5 mm from dimension determined and set difference by turning in adjusting screw (arrow) at correction lever.

Continue: L27/1 Fig.: L26/2

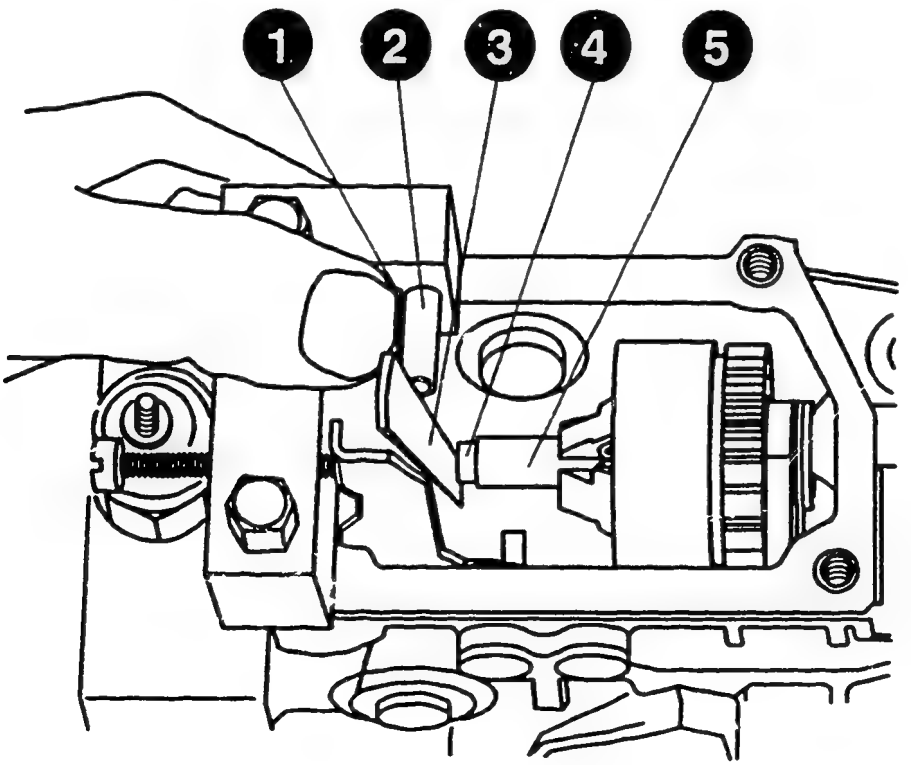


CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
 * Checking and adjusting MS dimension

1 = Clamping lever
2 = Stop pin
3 = Feeler gauge
4 = Plug
5 = Sliding sleeve

Dimension "MS" is the dimension
between plug and starting lever in
contact with clamping lever.
Press clamping lever against stop pin.
Use feeler gauge to measure dimension
MS and compare to set value stated
in test-specification sheet.

Continue: L28/1 Fig.: L27/2

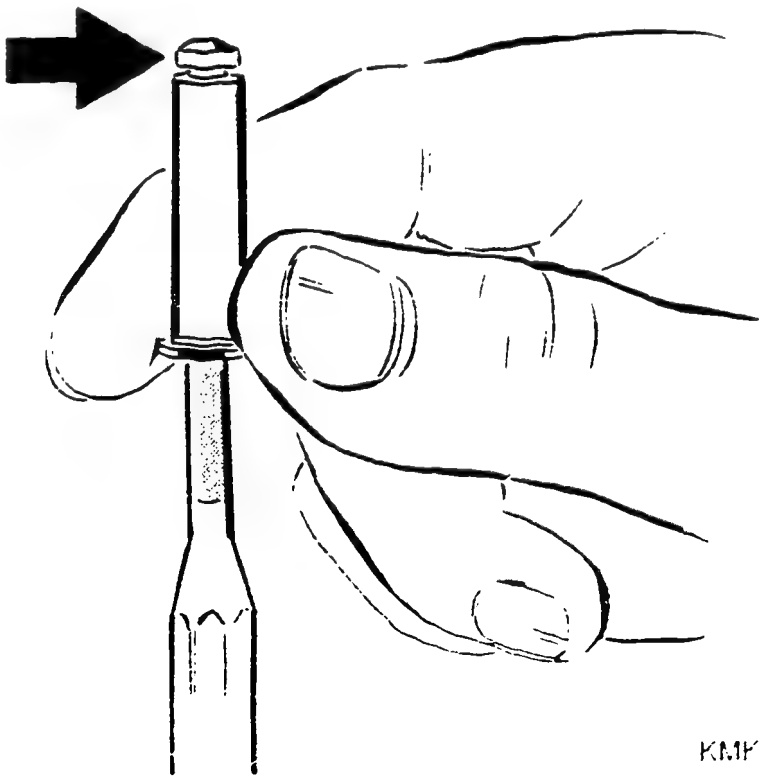


KMK03011

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
 * Checking and adjusting MS dimension

Provide compensation for difference in dimension by way of appropriate plug (arrow).
To do so, remove complete governor assembly and sliding sleeve.

Continue: M01/1 Fig.: L28/2

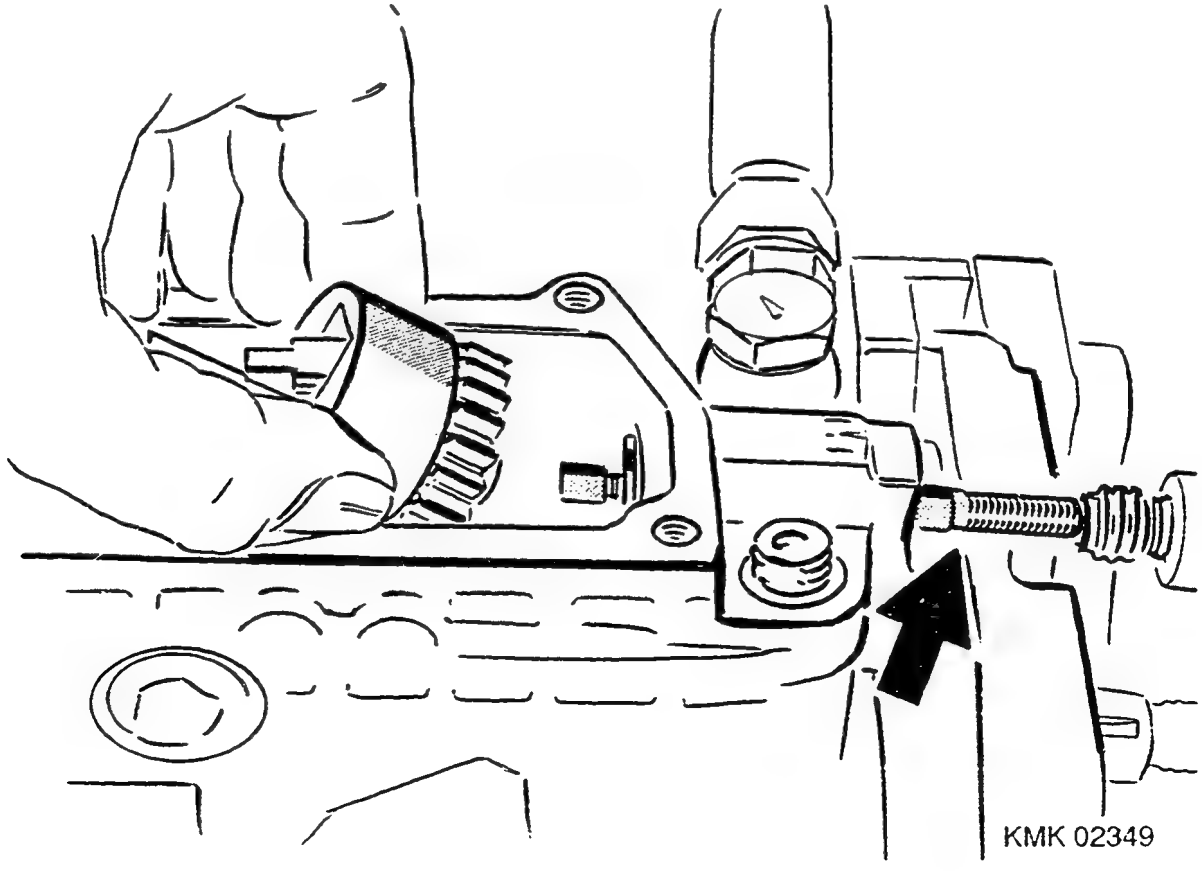


KMF 02352

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
* Checking and adjusting MS dimension

Loosen slotted hexagon nut at governor shaft and screw out governor shaft. Pull out governor shaft until threaded end coincides with outer edge of pump flange (arrow).

Continue: M02/1 Fig.: M01/2

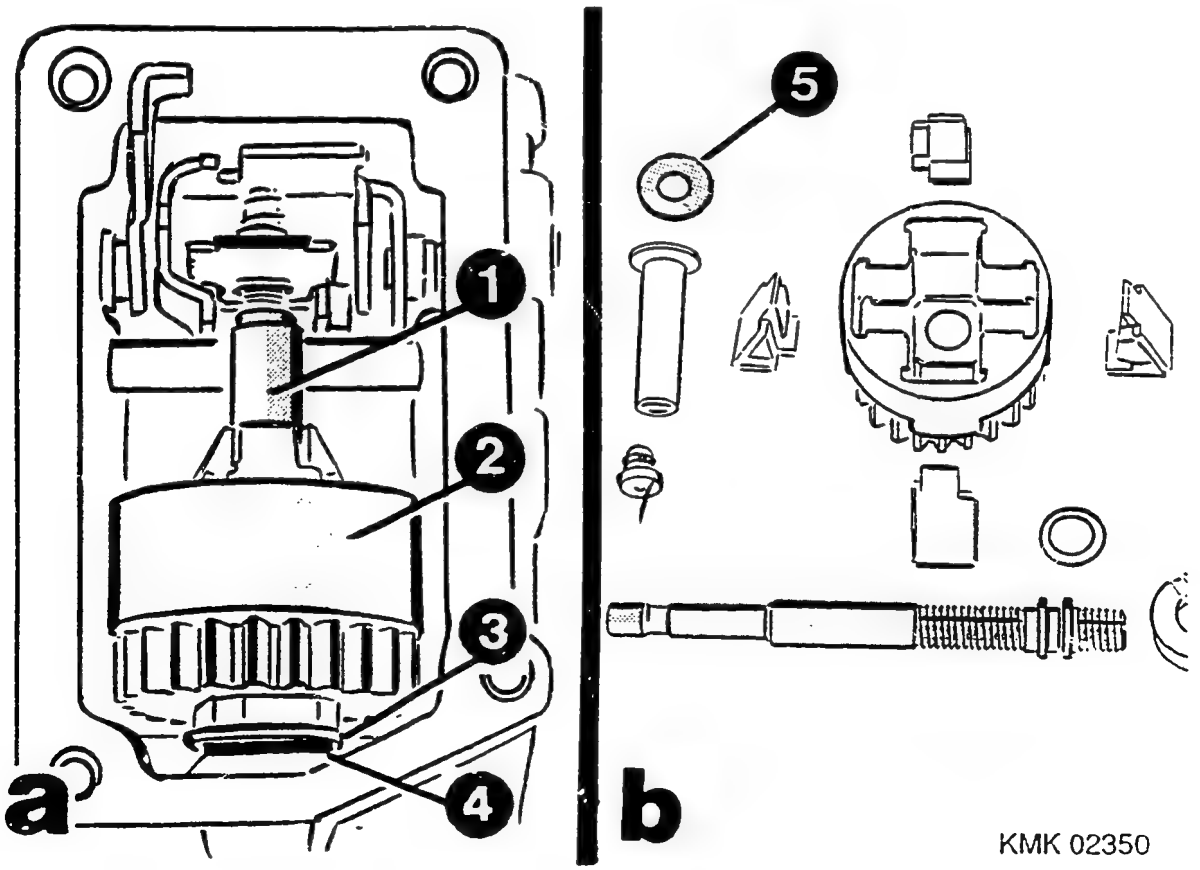


CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
* Checking and adjusting MS dimension

1 = Sliding sleeve
2 = Governor assembly
3 = Supporting plate
4 = Shims
5 = Spacers

Hold governor assembly with flyweights and sliding sleeve and pull upwards out of housing at an angle.
Remove supporting plate and shim plate.
Pay attention to spacer beneath sliding sleeve (take care not to lose) when disassembling governor assembly.

Continue: M03/1 Fig.: M02/2

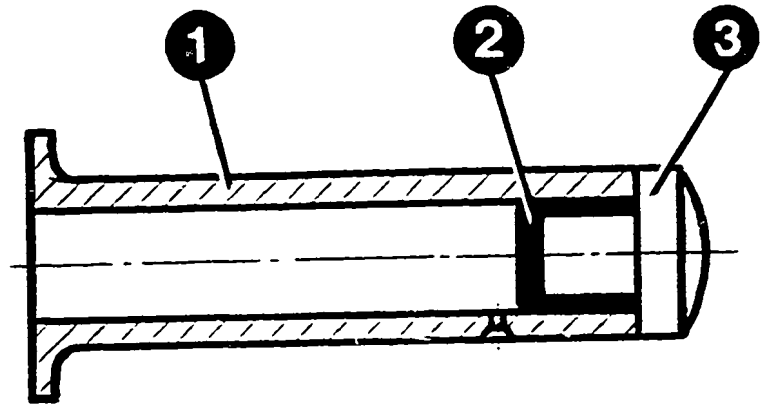


KMK 02350

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
 * Checking and adjusting MS dimension
1 = Sliding sleeve
2 = Rubber cap
3 = Plug

As of date of manufacture 927 the plug is fitted in the sliding sleeve with a rubber cap instead of a tab washer. The sliding sleeve has a countersunk restriction bore (refer to picture). Rubber cap may be fitted instead of tab washer. Sliding sleeve does not have to be replaced if restriction bore is not countersunk.

Continue: M04/1 Fig.: M03/2

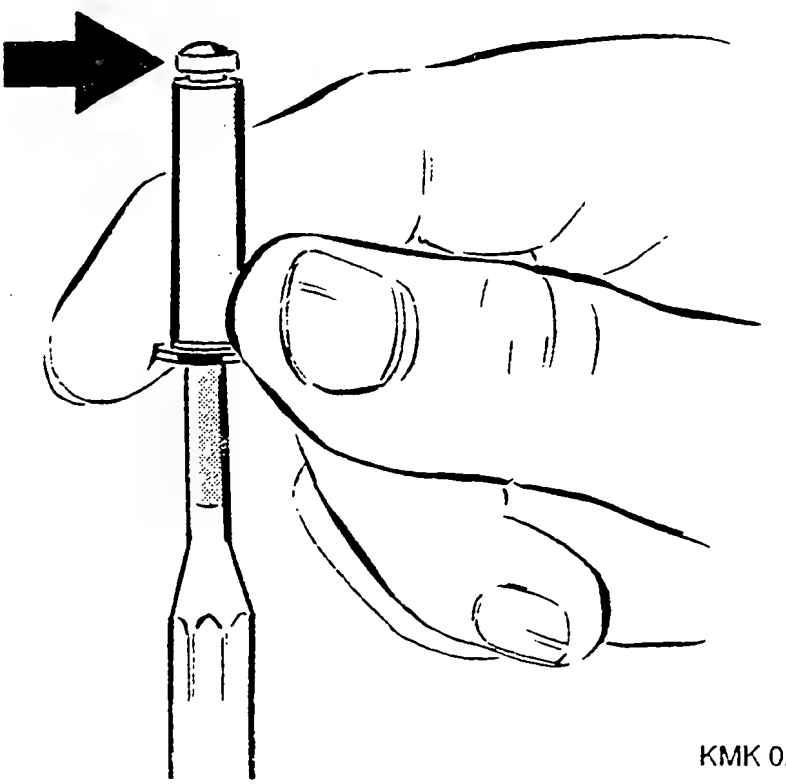


KMK 02351

CALIBRATING SLIDING-SLEEVE
STARTING TRAVEL
* Checking and adjusting MS dimension

Press out plug (arrow) with mandrel.
Pay attention to tab washer or rubber cap when pressing in appropriate plug.

Continue: M05/1 Fig.: M04/2



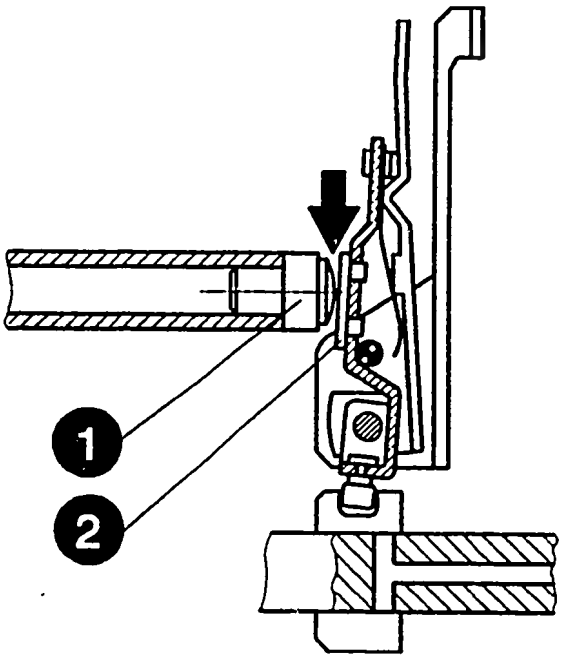
KMK 02352

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL
 * New plug version

1 = Plug
2 = Riveted-on plate

Pumps with plug and starting lever made of material DM05 – as can be seen from plug with grooves and starting lever with riveted-on plate (arrow) - may only be used in pairs.
Fit governor assembly and check "MS" again.
Insert governor section.
Fit housing cover, cylindrical helical coiled spring and control lever.

Continue: E15/1 Fig.: M05/2



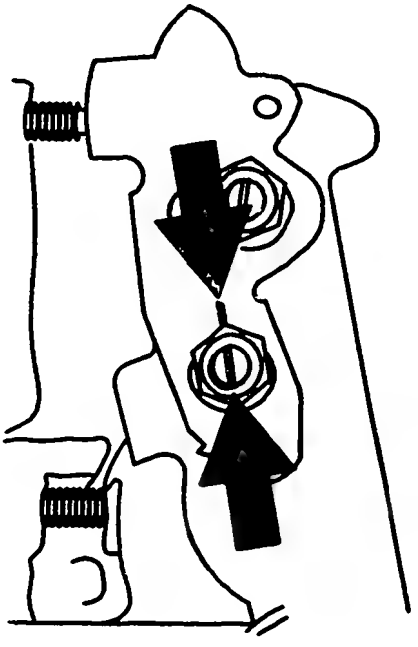
KMK02357

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

Mark control lever and shaft with respect to one another (arrows).
Remove control lever and coiled spring.
Remove fastening screws of LDA housing
If rated-speed adjusting screw has to be removed, measure screw-in depth beforehand and note it down. Raise LDA/HBA housing and push adjusting shaft through in direction of inside of cover.
Remove governor.

Continue: M07/1 Fig.: M06/2



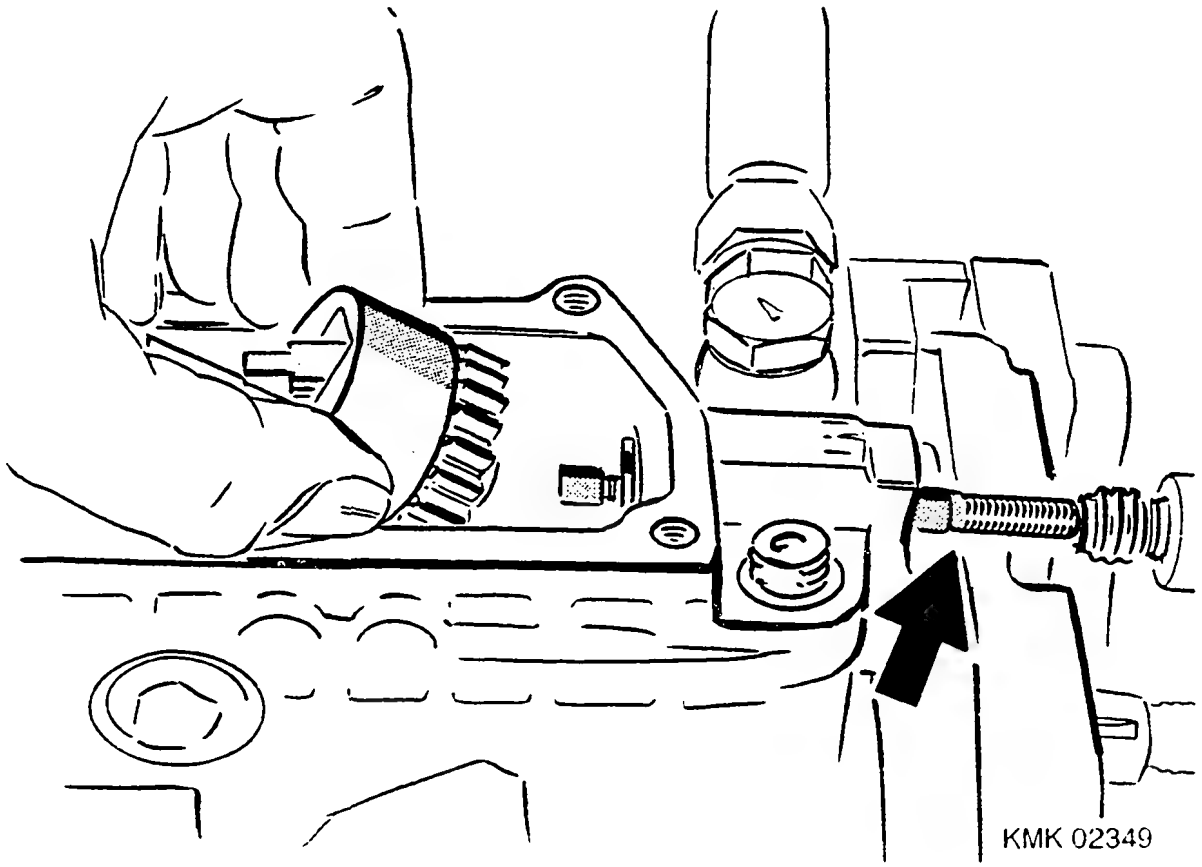
KMK02289

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

Loosen slotted hexagon nut at governor shaft and screw out governor shaft. Pull out governor shaft until threaded end coincides with outer edge of pump flange (arrow).

Continue: M08/1 Fig.: M07/2



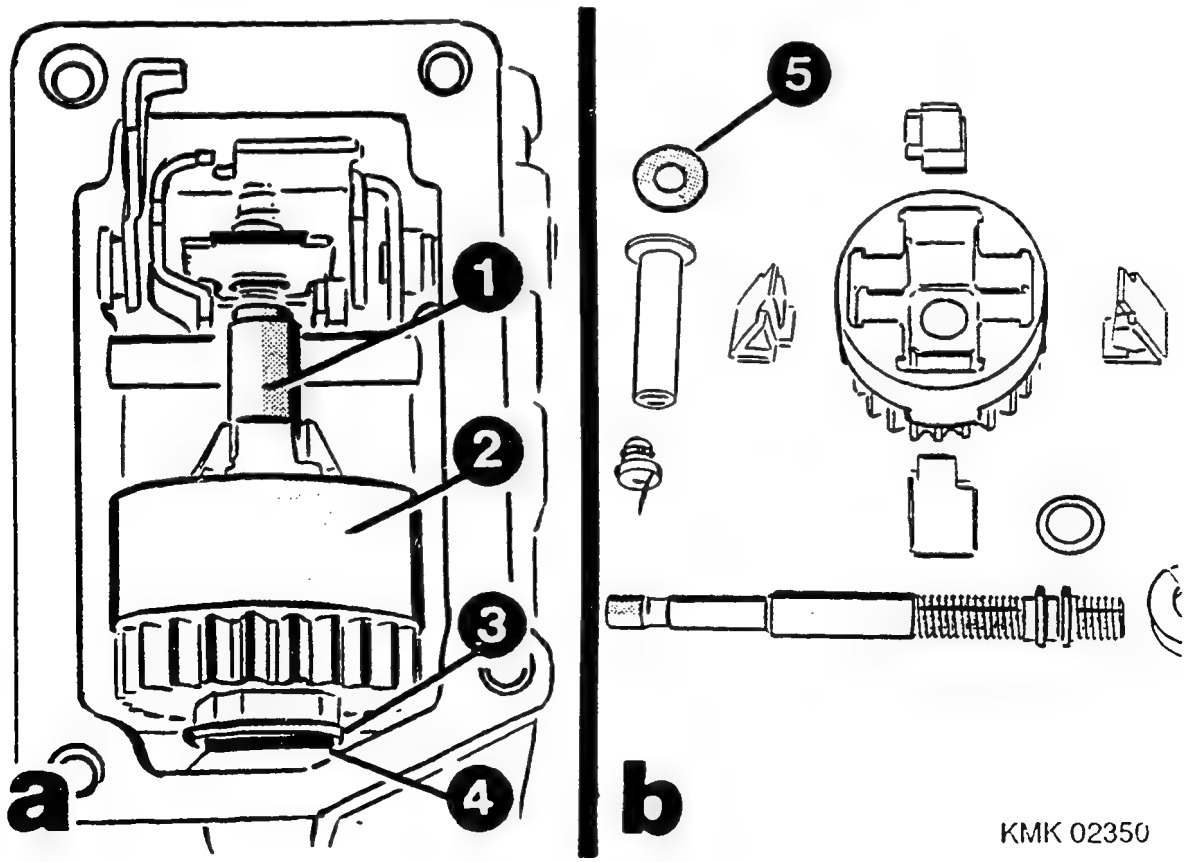
CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

1 = Sliding sleeve
2 = Governor assembly
3 = Supporting plate
4 = Shims
5 = Spacers

Hold governor assembly with flyweights and sliding sleeve and pull upwards at an angle out of housing.
Remove supporting plate and shim plate.
When disassembling governor assembly, pay particular attention to spacer beneath sliding sleeve (take care not to lose).

Continue: M09/1 Fig.: M08/2



KMK 02350

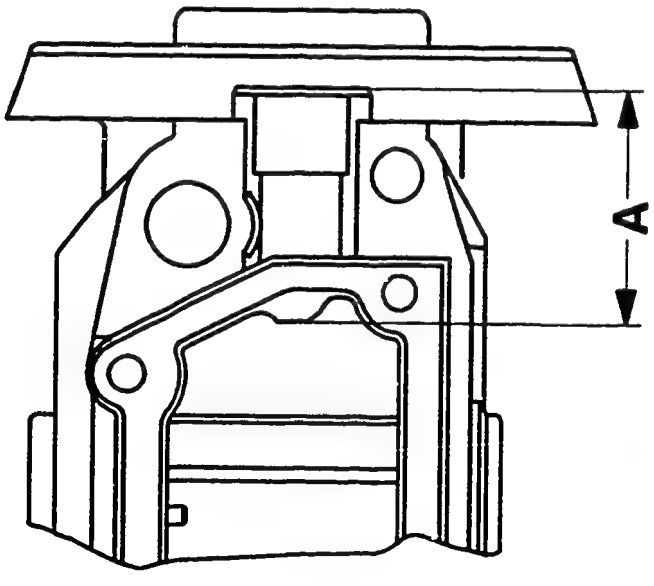
CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

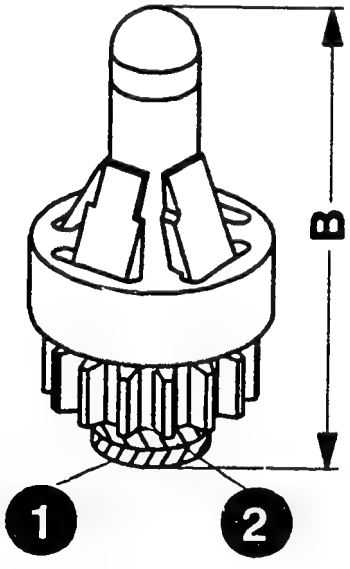
1 = Shim
2 = Supporting plate

Measure wall thickness of pump housing at governor shaft bore (picture a).
Note down dimension "A".
Place shim plate, supporting plate, governor assembly with flyweights and sliding sleeve on top of one another and measure height (picture b).
Note down dimension "B".

Continue: M10/1 Fig.: M09/2



a



b

KMK03012

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

Fit governor.
Attach LDA/HBA housing in position on pump housing without assembly.
Attach speed-control lever to control-lever shaft.
Pretension governor spring by positioning speed-control lever against rated-speed adjusting screw.

Continue: M11/1

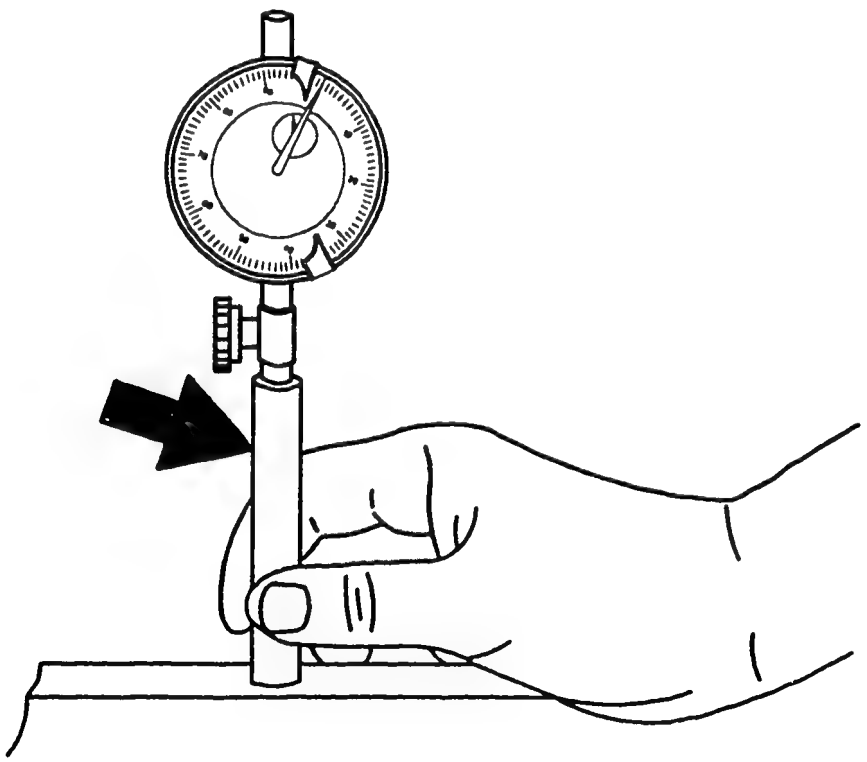
CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

1 = Adjustment sleeve

Clamp dial indicator in position in measuring device KDEP 1089.
Screw base (contained in measuring-device set) into dial indicator.
Slip measuring device into adjusting sleeve (100 mm long).
Pretension dial indicator to 15 mm on flat surface (surface plate, test bench bed).
Set scale to "zero".

Continue: M12/1 Fig.: M11/2



KMK03013

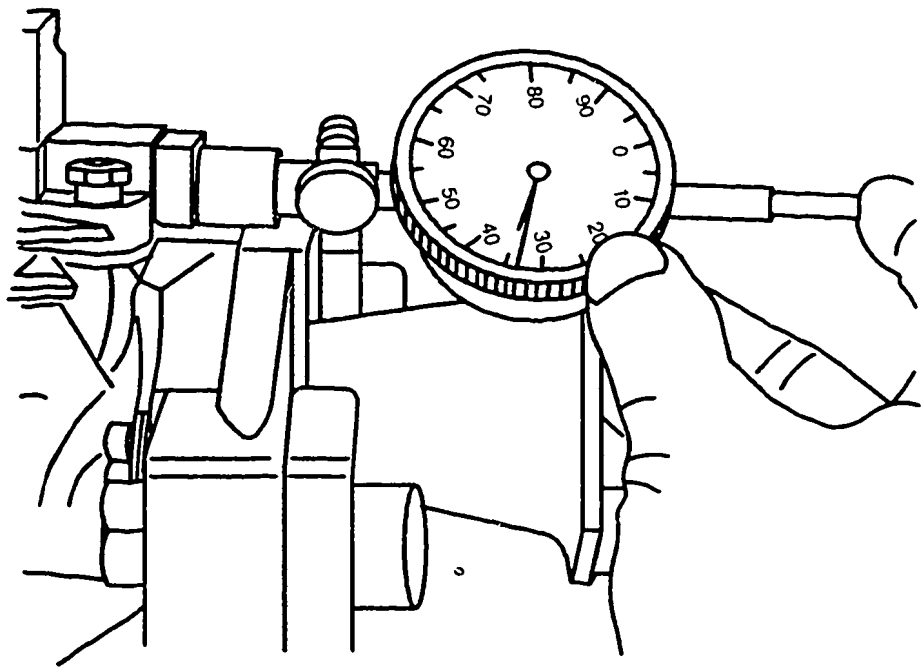
CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

Insert measuring device into hole in governor shaft as far as it will go.
Measure distance between outer edge of housing and start lever.
Note down dimension "C".

NOTE:
Do not overcompress start spring with this measurement; to avoid the above, press gently against dial indicator from behind.

Continue: M13/1 Fig.: M12/2



KMK03014

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

Read off measured value and add the value determined to 100 (length of adjusting sleeve).

E x a m p l e :

Pretensioned dial indicator		15.00 mm
Dimension read off	-	11.20 mm
Difference	=	3.80 mm
Length of adjusting sleeve		100.00 mm
Calculated difference	+	3.80 mm
Dimension "C"	=	103.80 mm

Continue: M14/1

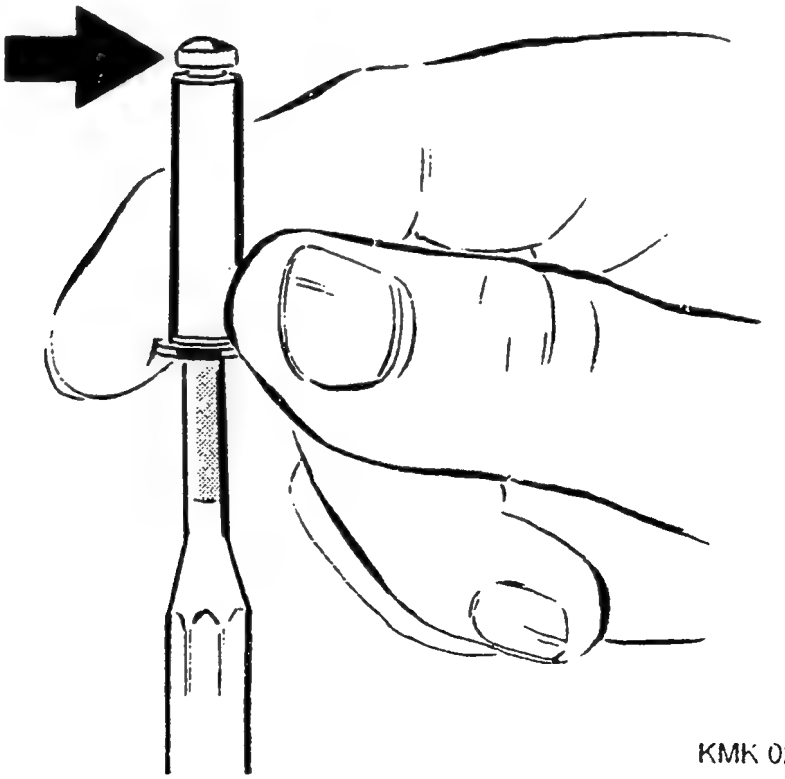
CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

The dimension "MS" (sliding-sleeve starting travel) results from:
MS = C - B - A

Compare dimension calculated to set value in test-specification sheet. Provide compensation for difference in dimension by way of appropriate plug (arrow) in sliding sleeve.

Continue: M15/1 Fig.: M14/2



KMK 02352

CALIBRATING SLIDING-SLEEVE STARTING TRAVEL

* Pump with negative torque control

After setting MS dimension, unscrew LDA/HBA housing and install governor assembly.
Bond shim plate and supporting plate into housing with grease.
Fit flyweights, sliding sleeve and governor shaft.
Fit governor and speed-control lever.
Repeat measurement of starting fuel delivery.

Continue: E15/1

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EDITORIAL NOTE

Published by:
After-Sales Service Department for
Training and
Technology (KH/VSK).
Time of going to press 09.1992.
Please direct questions and comments
concerning the contents to our
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country.

Continue: N28/2

EDITORIAL NOTE

Microfilmed in the Federal Republic of
Germany.

Microphotographié en République
Fédérale d'Allemagne.

Continue: A01/1